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CONSTRUCTION AND EQUIPMENT

No. 18



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CONSTRUCTION

PLANNING, FINANCIAL ASPECTS OF CONSTRUCTION INDUSTRY ANALYZED

Organization, Management

Moscow STROITEL'NAYA GAZETA in Russian 28 May 80 p 2

[Article by B. Boyev, sector head of NIIES of Gosstroy of the USSR]

[Text] Conversion to the two- and three-section control system provided by the party and government decree on improving the economic mechanism is impossible without purposeful ordering of the structure and functions of different formations and of strengthening organizations. Construction-installation production associations (PSMO) with annual work volume from 50 million rubles and above are created on this basis. They are distinguished by a higher level of organization, production and management, by a high degree of cycle closing and by production, economic and organizational unity.

The PSMO may contain general construction subdivisions, industrial enterprises, administrations of motor transport, mechanization and material-technical support and supply and service and auxiliary plants and farms.

The most serious and difficult restructuring remains. It is known that five- and six-section structure is still retained in some ministries (for example, in Minsel'stroy [Ministry of Rural Construction] of the USSR). Conversion to a three section management system is connected to objective difficulties caused by significant dispersion of construction in some regions of the country (Kazakhstan, Siberia and the Far East). And in some cases one should very carefully and intelligently approach restructuring. For example, it is even now clear that it is preferable to transfer the functions of the first section to the trust in Minsel'stroy of the Kazakh SSR. True, management will be difficult even in this case and therefore it must be supervised by the construction sections located in a radius of 200-250 kilometers. If mobile mechanized columns are subordinated directly to the republic ministry, this results in a sharp increase (8-10-fold) of the management apparatus.

Cases are known in practice when the association is a surplus section. One can name Tbilgorstroy, Frunzestroy and Gor'kiystroy (the two latter have already been disbanded) of Ministroy [Ministry of Construction] of the USSR

as an example. The management system can be represented in the given case as follows: Ministry of the USSR--the republic ministry--the Tbilgorstroy Association--the construction administration trust. A three-section system can be organized with this situation only if the association is made the main (primary) section. This means that there should be no additional mediators between the association apparatus and the production units. Large administrations or subdivisions of the trust type--an area--may emerge in the role of production units. That is, we are talking about increasing their capacity by concentration of labor, financial and material resources. In this case the association should centralize most planning-economic and production-economic functions.

These are the nuances of the problem. And if we have in mind restructuring as a whole, preference should be given to associations if the volume of concentrated construction comprises up to 200 million rubles annually.

It is worth mentioning that it is hardly worth dividing existing complexes into parts, as was done with the Cherepovetsmetallurgstroy Trust. Six large construction-installation trusts and one all-union association Cherepovetsmetallurgkhimstroy were created on its basis in 1976. The technical and economic indicators were worsened as a result of the breakup and the efficiency of the complex as a whole was reduced.

Restructuring the organizational structure of an administration, accomplished within general schemes, also delays the central apparatus of the construction ministry. The solution of strategic problems related to selection of the main directions of progress, long-term forecasting, development of a complex system of measures to increase construction efficiency and so on, emerges to the forefront for it.

Improving the work of the central apparatus should be carried out on a strictly scientific basis. Unfortunately, little attention is devoted to this part of restructuring at the construction ministries, obviously assuming that the existing structure of the apparatus is close to the reference structure.

What measures should be undertaken to convert to the two- and three-section system of management? The experience of developing the general schemes in some ministries shows that the best results occur where the level of organization of the management process is higher. Special subdivisions involved in problems of improving the management's system have been created at Minmontazhspeetsstroy [Ministry of Installation and Special Construction Work] of the USSR, Minenergo [Ministry of Power and Electrification] of the USSR and Mintransstroy [Ministry of Transport Construction].

Moreover, development of general schemes is drawn out in ministries in which workers of unspecialized subdivisions are involved in these problems. The inertia and conservatism of some local managers who do not desire to change anything in the established structure also strongly interfere.

A serious factor which delays strengthening of construction and installation organizations is the absence of material incentives for management personnel and supervisors in increasing production capacities. Therefore, implementing the corresponding regulations from the party and government decree must be accelerated.

The Scientific Research Institute of Construction Economics of Gosstroy of the USSR participated in preparation of instructions on the order of developing the general scheme and regulations on the construction-installation production association which have already been ratified by Gosstroy and Gosplan of the USSR. The institute published the "Recommendations on determining the economic effect from implementation of measures to improve the management structure of construction" in 1979. They make it possible to bring order to the method of calculations on economic analysis of the developed versions of the general schemes and provide comparability of the results obtained.

The "Procedural recommendations on formation of construction-installation production associations," published at the beginning of this year, may be of significant assistance to practitioners. The essence and main advantages of the PSMO are revealed in them and the most important principles, methods and content of the main steps of design and organization of work on formation and development of associations are given. The recommendations can be used by construction ministries and agencies at the stage of development and introduction of general schemes and also during further improvement of the organizational forms and structure of management.

Planning, Accounting

Moscow SEL'SKOYE ZHIZN' in Russian 25 May 80 p 2

[Article by I. Semenov, Deputy Minister of Rural Construction of the RFSFR]

[Text] There is the Cherepovetsel'stroy Trust [Expansion unknown] within the system of our ministry. Since the beginning of the five-year plan, this collective has put into operation 165 different facilities and capacities with total estimated cost of approximately 72 million rubles. All the facilities were mainly turned over simultaneously, some earlier than provided by the annual plans.

When we are talking about the primary tasks of builders in light of the decree of the CPSU Central Committee and the USSR Council of Ministers "On improving planning and intensifying the effect of the economic mechanism to increase production efficiency and work quality," such an activity as that of the Cherepovets and many other leading collectives is an example. According to the directions of the 25th CPSU Congress, the party is aiming at management and planning activities toward increasing production efficiency and work quality and of achieving high final results.

The main problem in capital construction is to accelerate introduction of production capacities and facilities into operation which are prepared to begin output of products or to render their services. This is now becoming the main indicator in planning and in analysis of the activity of construction organizations. Preparing for practical solution of the problems posed by the party on further improvement of the economic mechanism in construction, each labor collective has been called upon to universally think about the entire gamut of problems which arise in this regard since restructuring must not only be organizational. Psychological restructuring is no less important.

After all, the main indicators in planning and analysis of activity in construction until now were so-called "assimilation of capital investments" and "gross volume of construction-installation work." But the volume of construction-installation work also includes the cost of materials which the collective of builders received in finished form and to production of which no labor of any kind was contributed.

This situation will now be changed. In the final analysis planning and evaluation of the activity of the construction organization will be carried out by the normative net product, that is, by the contribution which the builders themselves have made to construction of a facility. As the first step on the path toward the new indicator, it is then provided to evaluate the economic activity of construction-installation organizations and also to carry out economic stimulation of them by the results of putting production capacities and facilities (commercial construction-production) into operation and also by the increase of labor productivity and profits. Gosstroy of the USSR with the participation of the construction ministries is preparing and estimate-normative base for gradual conversion to work by the new indicators during the 11th Five-Year Plan.

The index of commercial construction production does not have the deficiencies of the previous gross volume of construction-installation work. It reflects the interest of the state in the most rapid production of articles, products and services required by the national economy and also in reduction of uncompleted construction--that notorious "uncompleted construction" which is the scourge of construction production. For example, "uncompleted construction" exceeds the annual volume of work in those administrations of our ministry such as Kalininsel'stroy, Altaysel'stroy and the Buryattselin'stroy Trust.

Labor productivity in construction-installation organizations will also be planned in the coming five-year plan initially by the commercial and then by the net (normative) product or by some other indicator which more accurately reflects labor expenditures. The same is also true of the wage fund.

To implement this system of analyses, conversion to accounting between clients and contractors for completely finished and turned-over enterprises and facilities according to the estimated cost of the commercial construction product must be completed in 1981.

Conditions are also being created in construction for the most rapid completion of facilities being erected and putting them into operation with the payment ordinary for industry, where the product is initially produced and money is then received for it.

All construction organizations of Glavdal'sel'stroy [Main Administration for Rural Construction in Regions of the Far East], the Saratovsel'stroy Administration and the Orelsel'stroy, Cherepovetssel'stroy, Kabbalksel'stroy and Marstroytrest Trusts have been converted since the beginning of the year to the planning and accounting system for commercial products.

An important element for improving the economic mechanism in construction is recognizing the feasibility of converting to construction of facilities on credit offer to contract construction-installation organizations by Stroybank of the USSR as part of the total cost of construction with turnkey turnover of the object to the client. It is very important to distinguish this principle from the previous principle. Let us say, even now, many rural construction combines and other collectives are striving toward this activity and are making the corresponding pledges. But the builders still do not free the client from the concerns related to erection of facilities.

The new system of measures provides that the construction organization itself should be involved with supplying the facility with planning and estimate documentation, disposition of orders for equipment and implementation of these orders. The entire construction cycle--from the design to the facility product ready for production--is in the hands of the construction-installation organization which bears full responsibility to the state for fulfilling the task.

It is simple to organize this matter. A lot must be essentially set up in a new manner. The ministry planned to carry out a corresponding experiment at the Krasnodarkraysel'stroy Administration to determine better the methods of converting to mass introduction of the turnkey work method. Its results will become the methodological basis on which subsequent expansion of the new principles of rural construction will be based.

It is especially important to emphasize: the collective's responsibility for fulfilling the plan throughout the construction site as a whole will be increased sharply with introduction of these principles. Each year for the builder will begin literally with a clean page. Continuity of capital construction plans is provided with the new work procedure. Title pages, developed with regard to the standard length of construction, become a fixed planning document for the entire construction period, which is obligatory for the clients, contractors, planning, financial, banking and supply bodies and equipment and structure suppliers.

The new principles of accounting place very high requirements on the partners of the builders--the clients--primarily in providing the construction projects with planning-estimate documentation. A procedure has been

established in which, beginning in 1981, only those construction projects for which there are confirmed planning-estimates documentation and detail plans for the annual volume of work on 1 July prior to the planned construction, can be included in the capital construction plans. It would be very difficult to achieve this in rural construction. It was previously planned to present documentation by 1 September and this deadline was frequently not adhered to.

A traditionally complex problem is provision with material and technical resources and providing sets of equipment. Even these "bottlenecks" are now being corrected. The stable five-year plan of capital construction (with distribution of tasks by years), which will be confirmed beginning with the 11th Five-Year plan, by the ministries and agencies of the USSR and the councils of ministers of the union republics, will be strictly balanced with the resources of materials, production and energy equipment, with labor and financial resources and also with the capacities of the construction-installation organizations.

However, an error is being made where, thinking along lines of implementation of measures provided by the decree, it is concluded: it is still a long time until the 11th Five-Year Plan and we can operate as before for the time being. Minsel'stroy of the RSFSR held a meeting-seminar of workers of economic services of their local organizations and it was firmly stipulated there: there must be no delay in operating according to the new principle. The corresponding recommendations have been sent to local organizations. Measures to fulfill the decree remain to be worked out in all the labor collectives, achieving the fact that each worker consciously and actively participate in implementation of them.

Further industrialization of construction production on the basis of the best utilization of already developed production capacities must be achieved with any planning system in order to increase production efficiency and work quality. It is important to improve the activity of rural construction and house-building combines, to increase the plant readiness of parts and structures and to improve the complex engineering preparation of production.

Special attention was devoted in the decree of the CPSU Central Committee and the USSR Council of Ministers on the need to reduce the use of manual labor. More than one-fourth of all the working force is engaged in manual labor in finishing work in rural construction. There is a good deal of it in loading-unloading operations and in performing related-auxiliary functions. This means that the use of means of mechanization should be fundamentally improved and low mechanization should be widely introduced.

Enormous reserves for increasing production efficiency are hidden in improvement of labor organization and expansion of the brigade contract. Labor productivity in these collectives exceeded the average throughout the ministry by 30 percent in 1979. These brigades turned over most facilities for operation within the established deadlines and ahead of schedule with

good and excellent quality. But whereas more than half of all the work is performed by contract brigades in the Krasnodarkrayssel'stroy, Stavropol'sel'stroy, Sakhalinsel'stroy Administrations and the Yuzhuralelevatorstroy Trust, only 8-12 percent of the volume is performed by these brigades at the Gor'kovoblsel'stroy and Penzasel'stroy Administrations and the Omsk-tselinmontazh, Michurinsksel'stroy, Dagsel'stroy, Ul'yanovksel'stroy and Sychevskel'stroy Trusts. The proper attention is not devoted in many trusts and administrations to the use of piecework-bonus payment for labor, which also permits a 10-15 percent increase of labor productivity.

All this creates real reserves which must vitally be put into operation during conversion to the new forms of accounting in construction. It is just as important to overcome the indifference of some managers to the problem of better use of basic production funds. The fund return has decreased by more than 30 percent during the past three years at Glavtsentrosel'stroy and Glavprivolzhsksel'stroy. The capacities of industrial enterprises at Pskovsel'stroy and Sevostinsel'stroy Trusts are being used by less than one-half.

Matters are going well where party organizations of construction collectives deeply analyze such hardly special problems as: how are we fulfilling the profit plan? What is the situation with circulating funds? Is there no reason to intensify legal training? A decisive blow must be given everywhere to mismanagement, extravagance, graft and spoilage of material valuables. In preparing for further improvement of the accounting mechanism, it is important to tie this activity intimately to current practice.

There are many matters and concerns. All administrations and trusts must be fully prepared to convert to the new planning and economic incentives procedure and order must be brought in planning-accounting prices for materials and transport shipments. And finally, achieving introduction of all the starting facilities into operation, a firm foundation is laid for fulfilling the construction program of the five-year plan as a whole.

Financing, Credit

Moscow STROITEL'NAYA GAZETA in Russian 9 Apr 80 p 2

[Article by S. Volkov]

[Text] The Ministry of Industrial Construction of the USSR is conducting a series of interconnected meetings-seminars at which problems of fulfilling the decree of the CPSU Central Committee and of the USSR Council of Ministers on improvement of the economic mechanism are being discussed. One of these measures was carried out at Minsk. Responsible workers of the union ministry, economists and economic managers of the ministries of industrial construction of Azerbaijan, Armenia, Belorussia and the Ukraine and scientists of a number of institutes participated in it.

There are now no problems which more fully occupy the minds of economists, scientists and organizers of construction than those advanced to the forefront by this party and government decree.

To be fair it should be noted that it is considerably easier for Minpromstroy of the USSR than for someone else to implement the measures ensuing from the decree of the CPSU Central Committee and the USSR Council of Ministers on improving the economic mechanism. Economic work has traditionally been strongly supported in the system of the ministry and officials have purposefully and creatively engaged in it. To ascertain this, it was sufficient only to listen to the speeches of the meeting-seminar participants. The chief of the economic administration for construction of the republic ministry V. Ts. ul'skiy talked about the results of the economic experiment conducted at Minpromstroy of Belorussia. The chief of the main production-active administration of Minpromstroy of the Ukraine L. Yartun talked about the method first introduced at the Vinnitsapromstroy Combine. The deputy chief engineer of the Design and Production Institute of Minpromstroy of the USSR A. Aksentsev illuminated the problems of improving economic work, reporting about creation of methodical recommendations intended for this purpose.

Essentially, all proposals and recommendations advanced in the main reports made by the chiefs of the main planning-economic administration Yu. Rakhmanov and of the main production-active administration of Minpromstroy of the USSR M. Ikonnikov, were based on the results of many years of experiments and the experience of the leading construction organizations.

But alarm, and justified alarm, was heard all the time in the speeches of the meeting-seminar participants because not all the problems within the competence of the ministry have yet been resolved.

For example, there is no complete clarity in the finance and credit system. Some of its regulations cause different interpretations of practitioners. This became clear, specifically, from the speeches of the chief of the Department of Financial Administration of the union ministry R. Atanesyan, Candidate of Economic Sciences M. Podnos (NIIOUS attached to MISI imeni V. V. Kuybyshev) and the chief of the finance department of Minpromstroy of Azerbaijan L. Donets. Some other reporters also did not withhold attention from these problems. Moreover, their debate caused no alarm in this part. Obviously, all of them are calmed by the circumstance that Stroybank of the USSR and other central agencies responsible for creating the methodical and instructive documentation still have time for explanations, refinements and corrections if they are required.

Speeches on the problems of planning (specifically, commercial construction products), material and technical support and improvement of the management system were heard with hardly no concern.

As is known, the main activity during the next five-year plan will become a stable five-year plan for capital construction (with separation of tasks by years), balanced with all types of resources and capacities of construction organizations. It is time to begin this work, otherwise this plan may also not be achieved. But how to begin if there are yet no methodical instructions on this matter. How to begin if Gosplan of the USSR has not reported

the procedure, deadlines, main directions and input data for formulating the five-year plan?

A quite specific answer was heard to these questions at the meeting-seminar. Yu. Akhmanov demanded, despite whatever difficulties, that preparatory work be organized on formulation of the plan, utilizing experience previously accumulated. Primarily, he emphasized, the closest contact must be established with clients, they must not be given any indulgences whatever and the usual concessions must not be made, that is, one must act in complete accord with the letter and spirit of the party and government decrees.

The reporters' main attention was devoted to the new volumetric indicator--commercial construction product, which characterizes the final results of activity of construction and installation organizations. Minpromstroy, taking into account the four years of work of its own Belorussian Ministry, has good experience and no problems whatever should arise with the contractor concerning commercial construction products. But how matters will proceed on the part of the client no one can yet predict. Gosplan of the USSR has not yet issued the planning method. And even if it is published during the next few days, one cannot be confident of the readiness of the client ministries to arm themselves with it immediately. They do not have the necessary experience. The same can be said about formulation of five-year plans. The clients did not have these five-year plans on capital constructions which the party and government decrees requires.

Moreover, planning must be improved. The attention of the chief of the Administration of Construction Economics of Minpromstroy of Belorussia V. Teybul'skiy, who, in no way deriding the significance of five-year plans, allocates a visible role to two-year plans, is deserving of attention. He sees the value of two-year plans, which it is not so difficult to formulate under current conditions, in that they permit the clients to order equipment for the second year of construction on time, which provides normal rhythms of introducing objects and capacities.

Unfortunately, attempts of Minpromstroy of the USSR to work out a real plan for 1980-1981 came to naught because of the unpreparedness of the clients. Not having received plans for future capital investments from their ministries, the partners of the republic ministry ordered let us say the desired volumes not justified by reasoned calculations. Naturally, all planning work was an empty expenditure of efforts and time. And after all how good it will be to have a stable and real plan for the beginning of 1981. Perhaps it really makes sense not to bury two-year planning in oblivion until stable five-year plans are established. An affirmative answer to this question could be heard at the meeting-seminar in Minsk.

Almost every second reporter raised the question of deficiencies in material and technical support and everyone expressed dissatisfaction with the existing system. Great hopes to improve supply are linked to the party and government decree on improving the economic mechanism. The measures planned in this important document, by unanimous opinion, should significantly alter

the existing situation for the better, but it should not be forgotten that the decree, in solving the problem in principle, does not contain detailed instructions. The methods and instructions must still be worked out, but things are moving very slowly and the gathering of opinions has not proceeded further.

Minpromstroy of the USSR, supplied by the traditional scheme, has constantly had a shortfall of 5-8 percent of metal and 4-6 percent of cement of the needs determined by plans and estimates. This means that it lost a volume of work worth 120-150 million rubles. The suggestion of the union ministry to maintain the "millionaire" construction organizations did not accidentally encounter a known degree of scepticism. But the opinion of Gosstat of the USSR is not yet known.

Hopes for improvement in organizations of Minpromstroy are linked to introduction of the planning method, accounting and production-technological completeness in accounting for the reinforced complex brigade and of the method tested at the Vinnitspromstroy Combine and now widely used in Minpromstroy of the Ukraine.

The calculation is again toward our own abundant experience. This trend is followed very closely in the recommendations of the meeting-seminar. The approach is undoubtedly a correct one. One thing requires caution--is there enough experience or a reliability reserve for the coming restructuring of planning and economic activity if the construction organizations do not have the timely support from central agencies?

Commodity Output

Moscow STROITEL'NAYA GAZETA in Russian 15 Jun 80 p 2

[Article by L. Komarovskiy]

[Text] The Ministry of Industrial Construction of the USSR is conducting a series of interconnected meetings devoted to fulfilling the decree of the CPSU Central Committee and the USSR Council of Ministers on improvement of the economic mechanism. Our special correspondent was present at one of them.

A few hours before the beginning of the meeting at Ordzhonikidze, I handed out a questionnaire consisting of three questions to its participants: 1. If you were the "director" what would primarily be done to improve the economic mechanism in our organization? 2. It is said that implementation of the decree on improving the economic mechanism is caused by some psychological barrier. Do you feel that there is one? If yes, how is it expressed? 3. How do you evaluate the benefit of meetings similar to this one?

By the first smoke break, there were 20 or so detailed answers and the notes continue to come in.

What was in the answers? I shall present only some of them, having supplied myself with what I feel are the necessary commentaries. The chief of the Production-Control Administration of Glavstavropol'promstroy A. Reva feels that the system of operational planning of construction must primarily be changed--planning should be carried out for a specific executor rather than for a facility, as is most frequently done now. Preparation for production and support of it should also be oriented in this regard toward a specific executor--the construction-installation brigade.

Well, what then, everything is correct and it is difficult not to agree with A. Reva's opinion. Actually, the existing system of management in construction is hardly oriented toward a specific executor. But the need itself to primarily take into account the index of commercial product, which is stipulated by the decrees on improving the economic mechanism, forces one to orient himself toward the final result. And this means toward specific executors, otherwise it will be impossible to calculate the high reliability of deadlines for introducing an object.

Moreover, this experience exists now. And the experience is sufficiently known, since it was born in the same Minpromstroy of the USSR. I have in mind the Vinnitsa system in which planning and material and technical support are given directly to the executive brigade. It is known that this and also other economic experiments conducted in our sector during the past few years were organically part of new methods of management which are now being universally introduced. Minpromstroy of the USSR has an excellent opportunity in its own experience to familiarize all its subdivisions with the new methods of management and to organize serious and scrupulous training.

Answering the second question of the questionnaire, A. Reva, as all those questioned, said with rare unanimity, that there is undoubtedly a psychological barrier. I was shown his discussions on this topic undoubtedly of interest and therefore I will present them. In beginning to erect any facility, he feels that five problems must be solved: where to do it (the facility), what to do (what kind of work), who is to do it (the executors--workers or engineering and technical personnel), with what to do it (machinery, materials and structures) and how to do it (method, technology and quality). Work is usually begun after solving 2-3 of 5 problems, thus essentially condemning it to total or partial failure even before the beginning of the construction project. The decree is categorically against this situation of the system of economic measures itself and estimates of the activity of trusts, associations and ministries and it inspires one to break years of existing practice in which it was essentially important to being the construction project, while it will obviously be located there. But the main thing is not to begin but to complete the construction project and to introduce the facility. The indicators of the commercial construction product and the standard net product are oriented toward this. The usual "barrage" is uneconomical and it must be rejected in principle. And there is a serious psychological barrier in this which many now encounter:

there are still few managers who prefer not to rush in with introduction of innovations.

It should be said that the idea that no one can stand aside was clearly heard in the speeches of the managers of administrations and departments of Minpromstroy of the USSR A. Artamonov, V. Patskevich, V. Myagkovaya, I. Adamov and N. Vekeler at the seminar at Ordzhonikidze: the ministry has planned to actively introduce new indicators and other regulations on improving the economic mechanism. And now it is not only enough to consider this process, but to actively participate in it.

But the appearance of the chief of the territorial administration of Sevastopolpromstroy S. Chernyshev, who talked about a system of measures which is already being implemented in the collective for realizing the main regulations of the decree, was interesting in this regard. Personnel training was primarily organized and the experience accumulated by the builders of the republic was analyzed attentively.

The subdivisions of Minpromstroy in Northern Osetiya have regularly not fulfilled the plans for assimilation of capital investments from year to year and the level of "uncompleted construction" is also high here. Whether the use of chasing a "barrage" and being unable to arrive at a different result. But new people free of traditional habits have recently come to the management of the administration. They are placing their main bet on introduction of capacities and objects, orienting both the construction administrations and brigades toward this. And this means that they will be ready beforehand to work by the index of commercial construction product. This is very important since the psychological barrier cannot be broken in a single day.

The deputy chief of the Checheno-Ingush construction administration S. Serebryanny feels that the psychological barrier is aggravated by the absence of normative and instructive materials. And he is undoubtedly right--the absence of specific information and documentation now generates specific confusion. Thus, some instructions have recently appeared on some problems, specifically on commercial construction products. But even so the deadlines for issue of many documents are being extended. And this means that the omitted material would have to be hurriedly made up later.

And the curious paradox is noted here which the seminar participants remarked on. In answer to the questionnaire, the head of the department of the Design-Technological Institute of Minpromstroy of the USSR V. Kiselev writes: "I feel that the psychological barrier is included in the fact that the managers of many subdivisions have simply become confused, not having fully evaluated all discovered opportunities. After all, the role of an enterprise or trust manager increases significantly and more opportunities become available for independence. But what to do with it? This reminds me of a situation when a man, having pushed his way for a long time through a dense forest, finally emerged to the edge. On the one hand, there was a kind of joy--the forest has ended. But on the other hand, the previous question inevitably arises: where to now?"

Of course, the final goal of improving the economic mechanism in construction is clearly determined by the party and government decree. The paths leading to this goal are also known. But who is to set out on these paths and when is the principle question. Obviously, it is time to do this now.

And it must be said here that the meeting at Ordzhonikidze was undoubtedly useful, primarily from positions of implementing the decree. After a fruitful discussion of the main reports, the participants were divided into sections and analyzed in detail all the problems arising during the preliminary stage of working out the most important document. Thus was begun specific training, as a result of which much became clear.

In finishing these notes, I would like to present yet another generalized answer of the participants of the Ordzhonikidze meeting to the third question of the questionnaire. Many feel that training of practicing economists, engineering and technical personnel and all those who must introduce the main regulations on improving the economic mechanism should be urgently organized. The form in which this training will be conducted must still be resolved, and in the near future, otherwise overcoming the psychological barrier may be delayed.

Unit Method

Moscow STROITEL'NAYA GAZETA in Russian 4 May 80 p 2

[Part I of article by G. Savel'yev, senior scientific worker of TsNIIOMTP, candidate of technical sciences]

[Text] Some specialists of Mintyazhstroy [Ministry of Heavy Construction] of the Ukraine recommend the unit method of managing construction as the only one suitable in construction of large industrial facilities. However, this viewpoint is doubtful.

Do Not Forget About the Minuses

The most important criterion of the effectiveness of management methods should be the length of construction of facilities. The unit method was used in the Ukraine in construction of blast furnace No. 9 of the Krivoy Rog Metallurgical Plant, mill 3600 and the oxygen-converter shop of the Azovstal' Plant. The length of constructing the first facility comprised 48 months, that of the second was 72 months and that of the third was 51 months. That is, it exceeded the normative indices by a factor of 1.5-2. The actual number of workers at these facilities during the last year of construction was also 1.5-2 times higher than the planned number.

I feel that it is senseless to argue about advantages: the unit method did not yield positive results in its most important indicators on three of the most prestigious facilities.

Of course, it must be stipulated that a number of unfavorable factors affected the results. Therefore, let us consider the possibilities of the unit method used, so to say, in pure form.

Separating industrial complexes under construction into individual independent parts is nothing new. The characteristic feature of the unit method is division by technological principle. But this requires creation of a very large number of small autonomous subdivisions. For example, modified assemblies and subassemblies were isolated during construction of the oxygen-converter shop. The volume of construction and installation work of approximately half of them comprised less than two million rubles and the remaining work comprised less than one million rubles.

Practice convinces us that the presence of a large number of autonomous units complicates their support with planning-estimate documentation and requires creation of a cumbersome management apparatus. Thus, 30 people were involved in the apparatus of the complex at Azovstal', just as many were involved in working out the unit network schedules, there were 50 in the information and computer group, there were 20 planners, 70 PPR (work plan) workers and 21 persons were involved in managing subcomplexes. This was a total of 200 specialists. The wages for these workers alone exceeds several times the normative cost of PPR preparation.

There is yet another minus--continuous changing of the work supervisors. During the preparatory period, the local general contracting organization managed the construction project, then the chairman of the ministry managed it and a whole operational group managed it during the final stage. That is, the main principle of management is disrupted--one-man management according to the rules and duties of the executors. "Pluralism" leads to a loss of responsibility of the general contracting organization (the title holder). And it is also apparently inefficient to recruit the management workers of the ministry for prolonged operational work in construction of only a single facility.

The contracting organizations now use the most diverse methods of organizing construction: line, network (the critical path method), phase (integrated line), the "Ladoga," the complete block and other methods. Thus, the integrated line method used in construction of mill 2000 at Cherepovets made it possible to complete the work within 32 months instead of the planned 36 according to the norms (incidentally, a similar mill was erected in 51 months at Lipetsk). Considerable acceleration was achieved in erecting the thermoelectric power plants by the so-called "Ladoga" method. Why must these methods be ignored?

I feel that the unit method can be used only in erection of some specific facilities of ferrous and nonferrous metallurgy and a number of other sectors. The mentioned deficiencies must be eliminated to increase its efficiency: too much breaking down into units, the cumbersomeness of the management structure and the large volume of documentation.

And in principle the construction organizations must select their own optimum method in each specific case. I feel that the time has come to take "inventory" of the current methods and to determine the most effective areas of using them.

Unit Method (II)

Moscow STROITEL'NAYA GAZETA in Russian 4 May 80 p 2

[Part II of article by A. Tkachenko, chief of the main technical administration of Mintyashstroy of the Ukrainian SSR]

[Text] The editors acquainted specialists of the Mintyashstroy of the Ukraine with G. Savel'yev's article. Here is their view. The unit method is especially effective when planning, financing and supply of construction projects is clearly organized.

Let us first clarify what caused the appearance of this method.

It is difficult and sometimes even impossible when erecting large industrial complexes to analyze the situation correctly and to make the only valid decision. Therefore, the complex is divided into rather autonomous parts. Otherwise you have subsystems. Mintyashstroy of the Ukraine, the Kiev Engineering Construction Institute and the Pridneprovsk Promstroyproyekt adopted completion of a separate production cycle in the complex of the enterprise under construction for selection of subsystems, at which there is the possibility of autonomous organization of starting and adjusting operations.

Chief Savel'yev feels that this is bad: after all many small autonomous subdivisions will have to be created. This is not true: there are no more of them than usual. Moreover, they now attempt not simply to carry out a volume of work, but to turn over an operating production section. For example, temper mills can be tested and adjusted in rolling mills without waiting for completion of operations in the main production unit.

The unit method was first used completely at the beginning of the 1960s in erection of the thin-sheet mill 1700 of the Zhdanov Metallurgical Plant imeni Il'ich. The builders of the heavy industry enterprises of the Ukraine then used it in erection of large facilities of the mining, metallurgical and chemical industry.

True, the normal length of constructing some complexes was exceeded. But the unit method is not at fault. For example, the volume of construction and installation work comprised 117 million rubles or 63 percent of the total cost of work on the complex in construction of blast furnace No. 9 at Krivorozhstal' during the year of startup. Moreover, no more than 40 percent of the work should be carried out during the last 12 months according

to the norm. Naturally, this made it necessary to bring additional contract organizations to the construction site. It was not easy to coordinate their activities.

G. Savel'yev gives another example of exceeding the normative length of construction--the oxygen-converter shop at Azovstal'. This is true! But why did it occur? The planned task worked out by Ukreipromex (expansion unknown) as early as 1967 provided for locating three converter units with capacity of 180 tons each here, and in the immediate vicinity of the blast furnace shop. But a different decision was made during planning: install two converters of 350 tons each with steel teeming to three machines. However, there were no free sites for it. It became necessary to transfer a number of existing structures and communications lines.

The work here was also delayed due to the incomplete delivery of equipment. Approximately one-tenth of the detail plans (and there were about 80,000 of them) was changed during the course of construction.

But the use of the unit method in this situation made it possible to achieve high technical and economic indicators. On the whole the cost of construction-installation work throughout the complex was reduced by 33.4 million rubles compared to the estimated cost.

Expenditures on working out the network schedules themselves were also reduced. According to data of the Pridneprovsk Promstroyproyekt, the value of these expenditures was almost one-fifth less with the unit method compared to ordinary network schedules (calculated for one event). It is now no longer necessary to systematically recalculate the schedule and rearrange the network throughout the complex as a whole. But there is an advantage not only in this. There is the real possibility of detailing the work to a great degree and of bringing the production tasks to the brigades. It is impossible to do this with the traditional approach when tens of thousands of events are designated in the schedule. In brief, the total expenditures on working out and introduction of the organizational and technological documentation are insignificant with the unit method and are compensated for by an increased level of manageability of the system.

Nevertheless, it is impossible not to agree with G. Savel'yev in the following: there is a truly a need to analyze the current methods of organization of construction, to select the best ones and to make them obligatory for use.

Department of Industrial Construction "SG"

Undoubtedly, regardless of how good a method of organization and management of construction is in itself, the return from it will be low if order is not brought into planning, material and technical support and economic stimulation of the collectives. Further improvement of the economic mechanism provided by the decree of the CPSU Central Committee and the USSR

Council of Ministers makes it possible to overcome many difficulties in these areas. But at the same time this makes improvement of construction itself more timely. Moreover, not all reserves have been fully utilized in the unit method, as indicated by today's publications.

Therefore, the proposal to "take an inventory" of the current rather numerous methods of organization and management of construction cannot be recognized as topical. Naturally, this analysis will be more fruitful if a wide range of specialists: scientific workers and producers, participate in it. We would especially like to know the opinion of the builders of the Ukraine, Lipetsk, Cherepovets, Krasnoyarsk, Karaganda and other regions where large ferrous metallurgy facilities are being erected.

Orel 'Continuous' Method

Moscow STROITEL'NAYA GAZETA in Russian 6 Apr 80 p 3

[Article by A. Grabel'nikov]

[Text] The continuous planning system for construction of apartment buildings and sociocultural-service facilities has existed at Orel for eight years now. One of the most acute problems--rhythm of introducing facilities into operation--has been solved by using it. And what are the Orel workers erecting and what is the architectural level of the construction project?

Here they are, the fruits of the Orel "continuous" method--microrayons constructed recently in the city. Each of them was erected within an average of three years. These rates became possible due to production line construction which is gaining force "under the wing" of a single client. Housing tracts are erected much more slowly in cities where this method is absent. For example, the "G" microrayon required 15 years for construction at Ivanov due to dispersion of funds.

Housing tracts are located in all three rayons of the city, not far from bit enterprises. It is felt that an attempt is being made to take into account their interests here.

And even so the new blocks were amazing--all of them, like brothers, were similar to each other and they were literally filled with apartment buildings--representatives of the "121"-th series. The single facade and finishing of the buildings made the construction project impersonal and monotonous. What aroused the Orel workers to make a quality article following a quantity article, with the goal of a high aesthetic level?

"We worked out three modifications of the angular and two of the rotary block sections, built-in rooms and a dormitory with internal replanning of the first floor," says the chief of the complex department on design of facilities at Orel of the Orelgiprogorssel'stroy Institute A. Novozhilov. "Moreover, versions of the building facades, different enclosures and

decorative lattices for the stairwells were created. Different color finishing of the outside panels was thought of. All the developments were approved by the town building council, but much of that enumerated, unfortunately, remained on paper."

The chief architect of the city G. Rakitin explains the developing situation in this way:

"The house-building base at Orel is so weak that only one type of building can be permitted. What is there to say about architecture here."

Here is a concrete confirmation of that. A total of 60 additional types of articles was required to erect the 12- and 16-story buildings, the designs of which were developed by Orelgiprogor'stroy. But the plant workers, citing the difficulties in manufacturing the fittings and a shortage of production sites, refused to make them. That is why it was impossible to raise the city construction project higher than nine stories.

But the homebuilders can also understand. They have their own difficulties. The equipment at the local large panel plant is in a sad state: 419 of 468 molds for production of outside walls and particles are extremely worn and only 2 of 17 cartridge units are complete.

"Minpromstroy of the USSR did not allocate funds on time for reconstruction of the enterprise and in order to convert to the "121" series, the house builders had to use the old equipment, which has now become completely unsuitable," the chief engineer of DSK A. Bogatov explained the situation.

Additional shops are now being erected at the plant where it is planned to produce 140,000 square meters of housing of the "90" series annually. Special requirements are placed on the city which has become the father of the "continuous" method." One would hope that it will quickly spread its wings and raise itself to a new height. And therefore, before it is too late, it is worth explaining what the new series will provide to Orel. The chief engineer of the AKB-1 project of TsNIIEP of housing F. Volynskiy noted in this regard:

"It will not add floors since the standard project of our institute provides only nine-story buildings. In external appearance the buildings of the "90" series are very similar to those of the "121" series and it is rather difficult to distinguish one from the other. The difference is only in the fact that the panels of the new buildings will be faced with tile. Moreover, Orelstroy will begin mass construction no sooner than within three years. By this time the house-building kombinats of other cities will take a series of the next generations for construction which the TsNIIEP for housing is now developing."

"Replacing the '121' series by the '90' series cannot be evaluated otherwise as mismanagement: enormous funds will be expended on reconstruction

and as a result the city will receive houses similar in their face to the previous ones," the deputy chief of administration for housing construction of Gosgrazhdanstroy I. Zhivotovskiy expressed his view very categorically.

The chief architect of the city G. Rakitin and the deputy chief of the Department of Civil Housing Construction of Orelstroy V. Ovchinnikov held the same opinion. It is much more economical, they feel, if the nomenclature of the block sections of the "121" series is expanded in the shops under construction, that output of 12- and 16-story buildings be organized and that everything that was developed by the local planning institute be implemented. This will enrich the city construction project more than erection of buildings of two similar series and will help the enterprise to reach its design capacity more rapidly. It is still not too late to make this strategic turnabout now.

Start-up of new production is usually preceded by a lot of preparatory work. It was also necessary at Orel. First, the interests of the matter required changes in the structure of the house-building kombinat. Unlike other DSK, it is an association of only several construction-installation administrations completely separated from its own base--the large panel plant is located on an industrial base and is not subordinate to the kombinat. The DSK does not have finishers among its own subdivisions.

There is also no architecture-design offices which operate successfully at some leading kombinats. For example, the planners work out original solutions of the building facades for each microrayon at the Tallin DSK.

Undoubtedly, the planners, plant workers, builders and artists, in deciding what Orel will be tomorrow, must act in coordination. There is a tested format for this cooperation--the house-building agreement which has been convincingly confirmed by the practice of Yaroslavl', Murmansk and Zaporozh'ye. And what is typical--the Orel "continuous" method was approved in each of them as an integral rank of the house-building process. The agreement permits a purposeful search for expressive architectural solutions and to test the best of them in the standard rayons.

The Orel builders have made the first step toward this cooperation. They have concluded an agreement with the TsNIIIEP for housing together with a single client and designers. For example, it was provided that the workers of the institute would help to improve the production processes, would develop production of the inner wall structures, floors and finishing articles of light concrete in thermolite gravel.

The effectiveness of the agreement is limited for the time being to the framework of plant technology. This will possibly satisfy its participants during the first step. But it will be extremely important in the future to devote attention to the architectural aspect of the matter.

"We are ready to help the Orel workers introduce new architectural solutions in the construction project for housing tracts," said the manager of the technical assistance group of AKB-1 of TsNIIEP for housing A. Bykovskiy. "It is necessary only that they themselves show more initiative, that they propose their own developments and that they search for their own 'Orel' style of construction."

Enrichment of the Orel "continuous" method by a complex competition of house builders will help to make yet another step--to construct with beauty, creating a full living environment.

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CONSTRUCTION

FINANCIAL ASPECTS OF CONSTRUCTION REVIEWED

Commercial Construction Output Planning

Moscow EKONOMIKA STROITEL'STVA in Russian No 6, Jun 80 pp 14-23

[Article by R. V. Molotkov, subdivision Chief, USSR Gosplan, and Engineer A. F. Bogatyrev: "Commercial Construction Output Planning Methods"]

[Text] With the participation of the USSR Gosstroy, the USSR Minfin [Ministry of Finances], the USSR Stroybank [All-Union Bank for the Financing of Capital Investments], and the USSR TsSU [State Statistical Administration], the USSR Gosplan has prepared and approved the "Interim Methodological Directives on the Planning of Commercial Construction Output."*

These Directives are based on the appropriate provisions of the 12 July 1979 CPSU Central Committee and USSR Council of Ministers decree "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality" contained within the section dealing with the planning of construction production; these provisions stipulate that beginning with the 11th Five-Year Plan, ministries and departments doing construction and installation jobs, and construction and installation organizations must approve, as construction production indicators in their five-year and annual plans, the commercial construction output volume produced by common effort and through their own resources, showing the distribution of the total volume among clients. Client ministries and departments must approve the commercial construction output volume assignments for subordinated associations, enterprises, and organizations.

It should be noted that all of the basic provisions of the Directives have to be written almost entirely from scratch, with minimum experience in such an effort, acquired in the planning of the activities of relatively small, self-contained systems for construction organizations of the Belorussian SSR Ministry of Industrial Construction, the Belorussian SSR Ministry of Installation and Construction Work, and other republic ministries and main administrations included in the 1975-1979 experiment to improve the planning of

* Subsequently referred to as the Directives.

production and business activities and elevate the role of economic methods in the work.

The requirement now is to write up plans for construction output using the new system of indicators in application to both the individual subcontracting construction and installation organization and in relation to their sum total on a countrywide scale, with the new planning system embracing organizations at all levels of construction administration from the bottom up (from the primary organization to the ministry and department).

The Directives contain three sections: I. Commercial Construction Output Volume. II. The Order of Drafting Commercial Construction Output Plans. III. Amendment of Commercial Construction Output Plans on the Basis of Annual Work Results.

First let us discuss the composition and volume of commercial construction output. The simplicity of this problem that seems so apparent at first glance is very deceiving, because commercial construction output achieved as the result of the activities of construction organizations is distinguished by high diversity depending on the financing sources and the form of contract upon which construction of particular buildings and structures is based, and on when particular jobs are done. As an example a certain type of work done on the basis of a subcontractor's contract, which takes the form of a finished product from the standpoint of the specialized subcontracting organization, simultaneously becomes incomplete construction output to the construction organization serving as the general contractor.

The volume of commercial construction output includes first of all the estimated cost of construction and installation applicable to enterprises, their sections, and complexes and facilities still under construction but surrendered to the client and ready to begin production or render services. The volume of this output would make up the bulk of the total commercial output volume of construction organizations serving as general contractors.

The estimated cost of construction and installation applicable to these enterprises, sections, and complexes and facilities under construction is included in the figure for the actual commercial construction output volume after the State Acceptance Commission signs the document of their acceptance for operation.

The estimated cost of construction and installation applicable to enterprises (structures) built on the basis of loans provided by the USSR Srobybank to subcontracting construction and installation organizations equivalent to the total cost of building the enterprise (structure), as determined from the estimate approved by the general contractor (in reference to finished enterprises or structures surrendered to the client with no job undone), as well as construction and installation applicable to housing and municipal facilities is included within the actual volume of commercial construction output only after the State Acceptance Commission's document of their acceptance for operation is approved in the established order.

There may be cases in the construction of enterprises when certain buildings or structures contained within a given enterprise complex can and must be built and put into operation before construction is completed and the enterprise as a whole is placed into operation--for example, dining halls, plant administration buildings, warehousing space, railroad and motor road approaches, and so on. They may be utilized by the enterprise itself (included in the list of the building enterprise's fixed capital), or they may be rented to a subcontractor for his needs.

In connection with the above, the Directives foresee that the commercial construction output volume is to include the estimated cost of construction and installation applicable to individual buildings and structures prepared for production or for the rendering of services, contained with the composition of enterprises (sections, complexes), and surrendered to clients, if the operation of such buildings and structures is to begin before construction is finished and the operation (section, complex) as a whole is placed into operation. The possibility for commissioning these facilities must be spelled out by the plan for approved construction starts as well. The estimated cost of construction and installation applicable to the buildings and structures indicated above is included in the actual output once the document of their acceptance for operation is signed by the working commission.

Jobs foreseen by the plans for enterprises, sections, and facilities and by the summary estimates of their construction may remain undone following the commissioning of such enterprises, sections, and facilities, if they do not involve the pilot complex and if they are not a hindrance to production or to the rendering of services. This is why the Directives foresee that the estimated cost of such jobs is to be included in the commercial construction output volume. The estimated cost of these jobs is included within the actually completed commercial construction output volume after the document of their acceptance is drafted in the established order.

The commercial construction output volume also includes the estimated cost of jobs associated with public services and amenities, done in accordance with the USSR Gosstroy's 13 May 1974 Decree No 38 "On Deadlines for Completing Some Jobs Applicable to Public Services and Amenities on Construction Territory." The estimated cost of such jobs is included in the actually completed commercial construction output volume if the document of their acceptance is drafted in the established order.

A large quantity of temporary buildings and facilities requiring significant volumes of construction and installation are erected in the course of construction of large enterprises. These temporary buildings and structures are used by the subcontractor. The work experience of subcontracting organizations in the Belorussian experiment showed that this can be done only on the condition that such temporary buildings and structures are accepted for operation by the builder-enterprise, included within the list of his fixed capital, and rented by it to the subcontractor.

On this basis the Directives foresee that the estimated cost of construction and installation applicable to erecting temporary buildings and structures, built on the basis of a list foreseen within the construction organization plan, or separately approved by the client, and which are built on the basis of assets allocated for these purposes in the summary construction estimate's "Temporary Buildings and Structures" section, is included in the commercial construction output volume. These jobs are included in the actually completed commercial construction output volume if the document of their acceptance for operation has been signed by the working commission.

In addition to jobs done on the basis of general contracts, the commercial construction output volume also includes the estimated cost of finished facilities and complexes requiring special construction or installation jobs that are completed on the basis of direct contracts with builder-enterprises. The estimated cost of these facilities is included in the actually completed commercial construction output volume on the basis of documents signed by working commissions for the facility as a whole and, in relation to complexes of jobs, on the basis of the documents of acceptance of the completed jobs.

Overhauling and other contracted jobs make up a significant proportion of the work plans of contracting organizations. A unique feature of such jobs is that only annual contracts are signed for them as a rule, and the jobs are paid for as complexes of these jobs are completed or in accordance with what is agreed upon by the client and the contractor when they sign the contract.

In accordance with this the Directives establish that the cost of jobs in the overhauling category is included in the commercial construction output volume after completion of complexes of such jobs in relation to separate buildings and structures for which a cost estimate has been approved in the established order. A document of acceptance, by the client, of completed complexes of jobs associated with overhaul of individual buildings and structures is the basis for including these jobs in the commercial construction output volume.

The cost of other contracted jobs is included in the commercial construction output volume in accordance with the adopted system of paying for the completed jobs.

The Directives spell out that the estimated cost of complexes of special construction or installation jobs, completed by a given subcontracting organization at enterprises, pilot complexes, sections, and facilities under construction and submitted for inspection to general contractors, is the figure for commercial construction product output used by construction and installation organizations (irrespective of their subordination).

The Directives have approved various ways to account for the commercial construction output of subcontracting organizations depending on the types of special construction or installation jobs they do.

Thus if a subcontracting organization installs the principal production and power supply equipment, then the estimated cost of such jobs is accounted for within the volume of the subcontracting organization's commercial construction output if they are submitted concurrently with the commissioning, by general contractors, of the enterprises, their sections, pilot complexes and facilities prepared for production or for the rendering of services. These jobs are included in the actually completed volume in the order prescribed for general contractors.

The estimated cost of other complexes of special construction or installation jobs performed by subcontracting organizations is included in the commercial construction output volume of these organizations immediately after they are completed, on the basis of documents of acceptance of completed work, or documents of the working commissions, irrespective of the deadline imposed on the general contractors for commissioning the enterprises, pilot complexes, sections, and facilities at which these subcontracted jobs were completed.

As we can see from the above, the order adopted by the Directives is based on the principle of insuring prompt fulfillment, by subcontracting organizations, of complexes of special construction and installation jobs in accordance with subcontracting agreements and approved construction schedules. This order stimulates subcontracting organizations to finish their work and submit it for inspection to the general contractor faster, thus achieving their required commercial construction output volume and obtaining a possibility for paying off bank loans.

The general contractor, meanwhile, having accepted from the subcontractor a corresponding complex of jobs completed by the deadline established by the contract and the schedule, receives the possibility for continuing the work through his own resources or those of other subcontracting organizations, and for commissioning the finished enterprises, pilot complexes, sections, and facilities on time.

It should also be kept in mind that work done on the basis of subcontracting agreements by certain subdivisions of a construction and installation organization in behalf of other subdivisions of the same organization is not included in the commercial construction output volume if this organization is the principal khozraschet unit of construction production (a production construction-installation association or trust, and other organizations falling under the provisions of the Statute on the Socialist State Production Enterprise).

Considering that the Directives have established a system for determining the composition and volume of commercial construction output that is the

same for all forms of construction, and that particular cases typical only of certain groups of enterprises may be encountered in the actual planning, the Directives foresee that the particular order for determining the composition of commercial construction output associated with certain forms of specialized construction and unique facilities is to be established by the USSR Gosplan at the request of the appropriate USSR ministries and departments and union republic councils of ministers, with the approval of the USSR Gosstroy, USSR Minfin, USSR Sroymbank, and the USSR TsSU.

The Directives foresee that the commercial construction output volume applicable to enterprises and facilities surrendered to clients, the total commercial construction output volume, and the volume of commercial construction output achieved through a construction and installation organization's own resources are to be approved for the planning period for USSR and union republic ministries and departments involved in construction and installation.

The volume of commercial construction output applicable to enterprises and facilities turned over to clients is defined as the sum of the volumes of commercial construction output based on general and direct contracts, less the volume of overhauling and other contracted jobs.

The total commercial construction output volume is defined as the sum of the volumes of commercial construction output in the planning period, done on the basis of general and direct contracts (to include the volumes applicable to overhauling and other contracted jobs) as well as on the basis of subcontractor's agreements signed with other USSR and union republic ministries and departments.

The total commercial construction output volume is broken down in the plan (depending on financing sources) into work done on the basis of state capital investments, the assets of social organizations, housing construction co-operatives, and kolkhoses, and assets allocated for overhauling and other jobs; total volume is also broken down in relation to types of contracts (general, direct, and subcontractor's).

When determining the total volume of commercial construction output applicable to construction projects based on general and direct contracts and continuing on into 1981, we also include the estimated cost of construction and installation jobs applicable to facilities and construction stages that are accepted by the client on 1 January 1981, and which are reflected by the subcontractor in his report of plan completion (irrespective of whether the client had paid for the work or not).

Thus the total volume of commercial construction output associated with enterprises, pilot complexes, sections, and facilities placed into operation within the planning period would in all cases be equal to the estimated cost of construction and installation jobs completed since the beginning of their construction and prior to their commissioning (to include the

estimated cost of construction and installation jobs performed prior to the start of the planning period, including those finished by the contracting organization prior to transition to the new order of construction output planning).

It should also be kept in mind that the volume of work done by particular subcontracting organizations for other organizations within the same USSR or union republic ministry or department (work done on the basis of an internal subcontract) is not included in the total volume of commercial construction output of the corresponding USSR or union republic ministries and departments.

The volume of commercial construction done by an organization through its own resources is determined by subtracting, from the total commercial construction output volume, the volume of commercial construction finished (since the beginning of construction) on the basis of subcontractor's contracts with organizations of other USSR and union republic ministries and departments at enterprises, pilot complexes, sections, and facilities commissioned by the general contractor in the planning period.

In addition when we determine the commercial construction output volume we consider the volume of commercial construction completed on the basis of subcontractor's contracts by particular construction organizations for other organizations within the given USSR or union republic ministry or department (work done on the basis of an internal subcontract). In this case the appropriately determined volume of commercial construction done through the internal resources of a USSR or union republic ministry or department additionally contains the commercial construction output of subcontracting organizations of the corresponding USSR or union republic ministry or department resulting from completion of complexes of special construction and installation jobs at enterprises, pilot complexes, sections, and facilities presently under construction and subject to commissioning by general contractors at a time beyond the present planning period. Commercial construction performed by these subcontracting organizations prior to the start of the planning period at production enterprises and facilities to be commissioned by the general contractors in the planning period is excluded from this volume.

The estimated cost of jobs that are completed and submitted to clients (general contractors) prior to 1 January 1981 is not included in the volume of commercial construction completed through internal resources.

The Directives establish that a similar procedure is to be used to determine the commercial construction output volume applicable to enterprises and facilities surrendered to clients, and the total commercial construction output volume and that completed through internal resources for organizations at the intermediate administrative level (for union republic ministries and departments in the union republics, main territorial administrations, all-union construction associations, and other organizations equal to them).

These indicators are approved for the organizations above by the appropriate superior organizations.

For organizations of the basic administrative level (construction and installation associations, trusts, and other organizations falling under the provisions of the "Statute on the Socialist State Production Enterprise"), the commercial construction output volume applicable to enterprises and facilities surrendered to clients is defined as the sum of the volume of commercial construction done on the basis of general and direct contracts, less the volume of overhauling and other jobs, while the total volume includes overhauling and other contracted jobs, as well as work done on the basis of subcontractor's contracts for other organizations (irrespective of their subordination). The volume of commercial construction completed through internal resources is determined for these organizations by subtracting, from the total commercial construction output volume, the volume of commercial construction completed since the beginning of construction by other organizations on the basis of subcontractor's contracts at enterprises, sections, pilot complexes, and facilities surrendered by the general contractor in the planning period.

Commercial construction output is not planned for enterprises and organizations performing construction and installation jobs on a *khozaschet* basis.

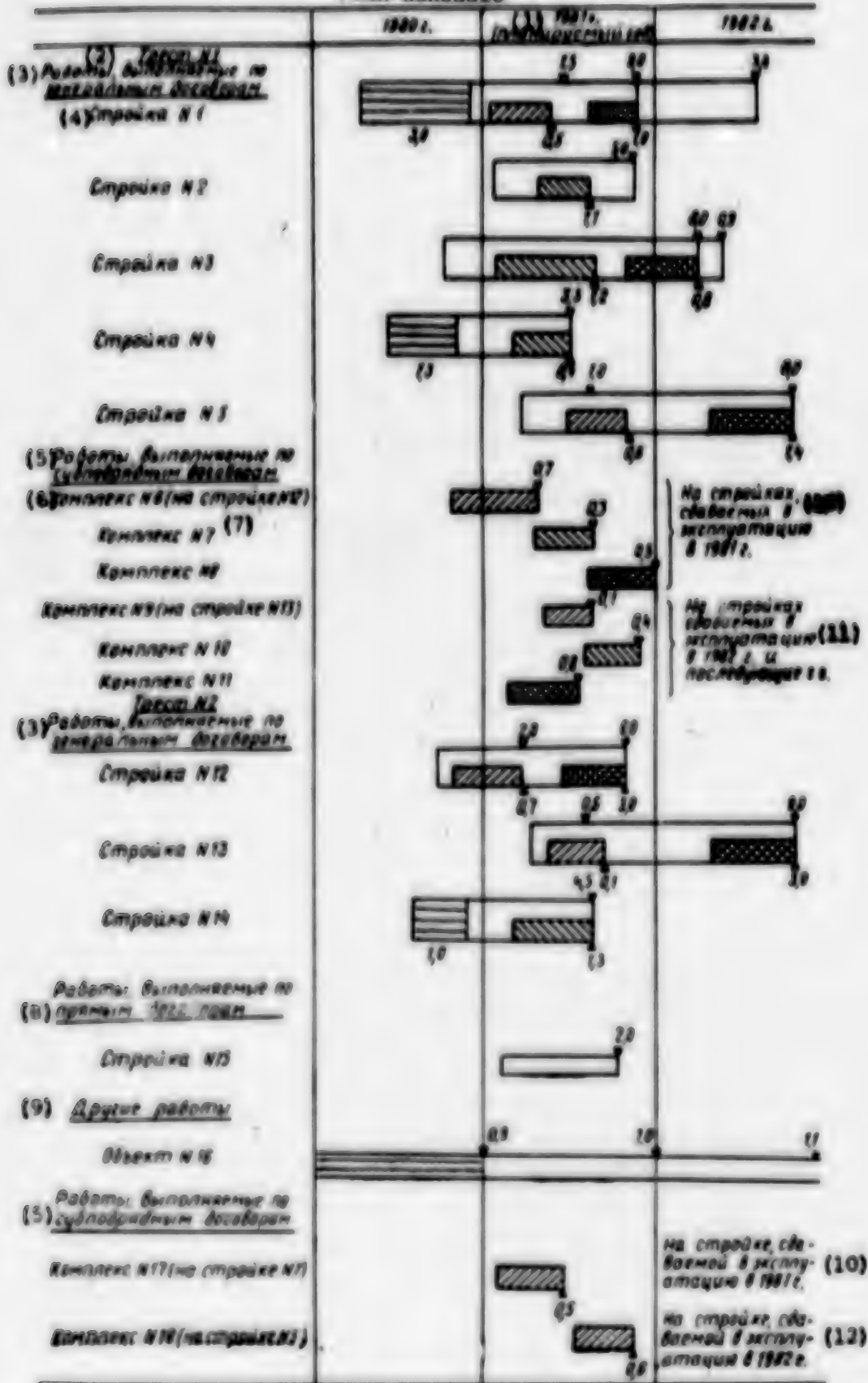
How is the volume of commercial construction output determined for different levels of a construction administration?

Let us assume that the work plans of construction and installation trusts No 1 and 2, subordinated to a certain main administration (or to another organization at the intermediate administrative level), are characterized by the data presented in the plan-schedule on the following page.

It should be kept in mind in this case that the volume of commercial construction to be surrendered to the client in 1981 in relation to construction project No 1--10, 5 million rubles ($1.5 + 9$)--includes 3 million rubles for work done at facilities and stages that were completed and surrendered to the client in 1980; the volume of similar work is 1.3 million rubles for construction project No 4, and 1 million rubles for construction project No 14. Subcontracted job complexes No 6, 7, 8, and 17 are being performed by the trusts at construction projects to be commissioned by the general contractors in 1981, while subcontracted job complexes No 9, 10, 11, and 18 apply to construction projects to be commissioned in a period beyond the planning year. The "Other Jobs" associated with construction project No 16 are included in the commercial construction output volume as they are completed.

The plan for commercial construction output is calculated in the following order.

Plan-Schedule

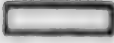
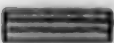


[key on following page]

Key:

- | | |
|--|--|
| 1. Planning year | 7. At construction project |
| 2. Trust | 8. Work done on the basis of direct contracts |
| 3. Work done on the basis of general contracts | 9. Other jobs |
| 4. Construction projects | 10. At construction projects commissioned in 1981 |
| 5. Work done on the basis of subcontractor's contracts | 11. At construction projects commissioned in 1982 and in the following years |
| 6. Complex | 12. At construction projects commissioned in 1982 |

Legend

-  Commercial construction output on the basis of a general contract
-  Facilities and stages at which construction is completed, and which are surrendered to the client prior to 1 January 1981
-  Subcontracted jobs done by organizations of the same administration (for organizations of that main administration)
-  Subcontracted jobs done by organizations of the same ministry (for organizations of the same ministry)
-  Subcontracted jobs done by organizations of other ministries (for organizations of other ministries)
-  Surrender deadline and volume of commercial construction (finished by general contractor and subcontractor) surrendered to client, millions of rubles

The total volume of commercial construction output for any organization at the basic administrative level may be expressed by the formula

$$O_{00} = EO_{00} + EC_{00} + EC_{00} + EC_{00}. \quad (1)$$

where O_{00} --total volume of commercial construction performed by an organization at the basic administrative level (a production association, a trust, or another organization at the basic administrative level);

EO_{00} --volume of commercial construction applicable to individual construction projects (enterprises, pilot complexes, sections, and facilities), done on the basis of general and direct contracts (this includes overhauling and other jobs);

- IC_{CT} --volume of complexes of subcontracted jobs completed for organizations of the same main administration (or for another superior organization at the intermediate level of the main administration);
- IC_{CM} --volume of complexes of subcontracted jobs done for organizations of the same union ministry (or USSR or union republic department);
- IC_{CM} --volume of complexes of subcontracting jobs done for organizations of other USSR ministries (or USSR or union republic departments).

In this example, the total commercial construction output volume for 1981 would be:

a) for Trust No 1--

$$O_{CG} = (10.5+5.0+3.5+1)+(0.7+0.1)+(0.3+0.4)+(0.5+0.8) = 22.8 \text{ millions of rubles}$$

The volume of commercial construction done on the basis of general contracts at enterprises and facilities that are surrendered to the clients would be 20 million rubles in the trust's plan, while the volume of work done on the basis of subcontractor's contracts would be 2.8 million rubles;

b) for Trust No 2--

$$O_{CG} = (8.0+0.6+4.5+2+1)+(0.5+0.6) = 17.2 \text{ millions of rubles}$$

Here the volume of commercial construction performed on the basis of general and direct contracts at enterprises and facilities surrendered to clients would be 15.1 million rubles, the volume of other contracted work would be 1 million rubles, and work done on the basis of subcontractor's contracts would total 1.1 million rubles.

The continuity of calculation of the total volume of commercial construction output by organizations of the basic administrative level (the trust in our example) and by organizations at the intermediate administrative level (the main administration for example) can be seen from the following: Factor IC_{CT} --that is, the volume of subcontracted jobs done for organizations of the same main administration--is excluded from formula (1) in the determination of the total volume of such output for the intermediate administrative level. Consequently the formula used to determine total commercial construction output volume for organizations of the intermediate administrative level would have the form:

$$O_{CG} = IO_{CM} + IC_{CM} + IC_{CM}, \quad (2)$$

where O_{CG} is the total volume of commercial construction completed by the organization at the intermediate administrative level (main administration, all-union construction association, and so on).

In our example the total volume of commercial construction output for the main administration would be:

$$O_{\text{CG}} = (20.0 + 16.1) + (0.3 + 0.4) + (0.5 + 0.8) = 38.1 \text{ millions of rubles}$$

This is equal to the total commercial construction output volume of the trusts (40 million rubles) reduced by work based on an internal subcontract signed within the main administration (1.9 million rubles).

On analogy with the continuity indicated above in the computations of total commercial construction output volumes for organizations at the basic administrative level and the main administration, when this indicator is computed at the union ministry (or union republic) level, factor IC_{CG} , which is the volume of subcontracted work done within the ministry through its own resources, must be excluded from formula (2). In this connection the formula for computing the total commercial construction output volume for the USSR or union republic ministry or department can be written in the following form:

$$O_{\text{CG}} = IO_{\text{CG}} + IC_{\text{CG}} \quad (3)$$

where O_{CG} is the total volume of commercial construction completed by an organization at the top administrative level (USSR or union republic ministry or department).

In this example out of the total volume of commercial construction output for the trusts (40 million rubles) and the main administration (38.1 million rubles), the following would be included in the total commercial construction output volume for the ministry: 36.1 million rubles + 1.3 million rubles--that is, 37.4 million rubles, which is equal to the total commercial construction output volume for the main administration, less the volume of work done on the basis of subcontracts signed within the ministry--0.7 million rubles (0.3+0.4).

Using the procedure explained above for determining commercial construction output volume, the volume of such work done by internal resources of an organization at the intermediate administrative level (a trust, a production association) may be expressed by the following formula:

$$O_{\text{CG}}^i = O_{\text{CG}} - IC_{\text{CG}}^* - IC_{\text{CG}}^* - IC_{\text{CG}}^* - IO_{\text{CG}} \quad (4)$$

where O_{CG}^i --volume of commercial construction done by the internal resources of an organization at the basic administrative level (a trust, a production association, or another organization at the basic administrative level);

IC_{gr}^B --the volume of work done by subcontracting organizations of the same main administration at enterprises, their sections, pilot complexes, and facilities to be placed into operation in the planning period, since the beginning of their construction in the planning year inclusively;

IC_{gr}^B --as above, but in relation to the same USSR or union republic ministry or department;

IC_{gr}^B --as above, for other USSR and union republic ministries and departments;

IO_{gr} --volume of work done in construction stages and at facilities completed and surrendered to clients prior to 1 January 1981.

In this example the volume of commercial construction completed by internal resources would be:

a) for Trust No 1

$$OC_{O3} = 22.8 - (0.5) - (1.1 + 0.4) - (1) - (3.0 + 1.3) = 15.5 \text{ millions of rubles;}$$

b) for Trust No 2

$$OC_{O3} = 17.2 - (0.7) - (1.3) - (3) - (1.0) = 11.2 \text{ millions of rubles.}$$

In this case the volume of commercial construction performed by internal resources would be: for construction project No 1--6 million rubles, for construction project No 2--3.9 million rubles, for construction project No 4--1.8 million rubles, for construction project No 5--1 million rubles, for construction project No 12--4.3 million rubles, for construction project No 13--0.6 million rubles, for construction project No 14--2.2 million rubles, for construction project No 5--2 million rubles, for construction project No 16--1 million rubles, and, for jobs done on the basis of subcontractor's contractors, 2.8 million rubles for Trust No 1, and 1.1 million rubles for Trust No 2.

The volume of commercial construction performed by internal resources of an organization at the intermediate administrative level (main administration, all-union construction association, and so on) would be expressed by the following formula:

$$OC_{O3} = OC_{O3} - IC_{gr}^B - IC_{gr}^B - \\ - IO_{gr} - IC_{gr}^B + IC_{gr}^B. \quad (5)$$

where OC_{O3} --volume of commercial construction performed by the internal resources of an organization at the intermediate administrative level (a main administration, an all-union construction association, and so on);

$\Sigma C_{\text{CT}}^{\text{III}}$ --volume of subcontracted jobs performed for organizations of the same main administration before the start of the planning period, at enterprises, sections, pilot complexes, and facilities to be commissioned in the planning period;

$\Sigma C_{\text{CT}}^{\text{GN}}$ --volume of subcontracted jobs completed for organizations of the same main administration within the planning period, at enterprises, sections, pilot complexes, and facilities to be commissioned in a time following the planning period.

The volume of commercial construction completed through the main administration's internal resources would be:

$$O_{\text{C}}^{\text{C}} = 38.1 - (1.1 + 0.4 + 1.3) - (1.0 + 3) - (3 + 1.3 + 1) - (0) + (0.1 + 0.6) = 26.7 \text{ millions of rubles}$$

($\Sigma C_{\text{CT}}^{\text{III}}$ equals zero in this example).

The formula for computing volume of commercial construction completed by internal resources of a USSR or union republic ministry (department) would have the following form:

$$O_{\text{B}}^{\text{C}} = O_{\text{B}} - \Sigma C_{\text{CT}}^{\text{I}} - \Sigma C_{\text{CT}}^{\text{II}} - \Sigma C_{\text{CT}}^{\text{III}} - \Sigma C_{\text{CT}}^{\text{GN}} + \Sigma C_{\text{CT}}^{\text{GN}} + \Sigma C_{\text{CT}}^{\text{GN}} \quad (6)$$

where O_{B}^{C} --volume of commercial construction completed by the internal resources of the USSR or union republic ministry's (department's) organizations;

$\Sigma C_{\text{CT}}^{\text{I}}$ --volume of subcontracted jobs completed for organizations of the same USSR or union republic ministry (department) prior to the beginning of the planning period, at enterprises, sections, pilot complexes, and facilities to be commissioned in the planning period;

$\Sigma C_{\text{CT}}^{\text{GN}}$ --volume of subcontracted jobs completed for organizations of the same USSR or union republic ministry (department) in the planning period, at enterprises, sections, pilot complexes, and facilities subject to commissioning at a time beyond the planning period.

The volume of commercial construction completed by the internal resources of a USSR ministry would be :

$$O_{\text{B}}^{\text{C}} = 37.4 - (1.0 + 3.0) - (3.0 + 1.3 + 1.0) - (0) - (0) - (0) + (0.1 + 0.6) + (0.4) = 29.2 \text{ millions of rubles}$$

($\Sigma C_{\text{CT}}^{\text{I}}$ and $\Sigma C_{\text{CT}}^{\text{II}}$ are equal to zero, as in the previous computations for a main administration).

In the presented computations of the 1981 volumes of commercial construction completed through internal resources, indicators EC_{CM}^B , EC_{CM}^B , EC_{CM}^B are equal to the volume adopted for just the planning year, while indicators EC_{CM}^{UB} and EC_{CM}^{UB} are equal to zero, since the example is based on the assumption that the organizations will switch to the new planning and computation system as of 1981. Calculating the 1982 plan on the basis of the conditions of the examples presented above, the volume of subcontracted jobs completed as of the beginning of 1982 by organizations subordinated to the main administration, at construction projects to be commissioned in 1982 (indicator EC_{CM}^{UB}), would be 0.7 million rubles (construction project No 5--0.6 million rubles, and construction project No 13--0.1 million rubles), while for organizations subordinated to the USSR ministry (indicator EC_{CM}^{UB}) the figure would be 1.2 million rubles (construction project No 3).

Such in general terms is the order for computing the volumes of commercial construction output for different administrative levels in construction. The need for making these computations stems from the fact that the total commercial construction done by subcontracting organizations was assumed equal to the complexes of special construction and installation jobs done by them and submitted for approval to general contractors before the latter complete their construction and place the entire enterprises, sections, and plant complexes into operation (the time the commercial construction product of general contractors is formed is different from the time that of subcontracting organizations is formed).

USSR and union republic ministries and departments write draft plans of commercial construction output on the basis of formats approved by the USSR Gosplan.

It should be kept in mind in this case that forms No 1-PKST (commercial construction output plan for a USSR ministry or department, or a union republic council of ministers) and No 2-PKST (distribution of the volumes of commercial construction output among executors) were developed with an eye on using them to calculate indicators for commercial construction output of the national economy as a whole, and in relation to USSR and union republic ministries and departments performing construction and installation jobs. These same forms may also be used (following appropriate changes) by subordinated organizations depending on the order of planning adopted within the system.

In contrast to forms No 1-PKST and No 2-PKST, form No 4-PKS (record-order) is the only document that must be filled out by all organizations, both client and contractor. The filled out form must contain information needed to calculate the total commercial construction output volume and the commercial construction volume completed through internal resources. Indicators on this form must be summarizable, so that results could be reflected at all levels of construction administration.

The Directives established that five-year and annual plans for commercial construction output are to be developed first at the level of client production associations, enterprises, and organizations, contracting production construction-installation associations, trusts, and other organizations equal to them, as part of the five-year and annual plans of economic and social development of the USSR.

The draft five-year plans are based on control figures established for clients on the basis of construction and installation limits, lists of new construction projects, the planned deadlines for commissioning output capacities and construction facilities and the cost of construction and installation associated with them, title lists of carried-over and newly begun (during the first year of the five-year plan) construction projects, and appropriately approved planning and estimate documents; pilot complexes are singled out in the necessary cases.

For housing facilities and other nonproductive facilities, for which it is impossible to write up an itemized list of construction projects to be entered into the five-year plan, the volume of commercial construction output for the five-year plan (broken down into individual years) may be determined, as an exception, on the basis of the planned volumes of contracted construction and installation jobs and the unit cost of construction and installation jobs per unit of measurement of facilities being placed into operation, using natural indicators (square meters of total area in residential buildings, quantity of student places, and so on).

In addition the Directives state that commercial construction output assignments set for a particular year in the five-year plan are written out specifically, and in certain cases they are specially mentioned in annual plans.

Annual plans for commercial construction output are drafted on the basis of assignments, stated in the annual plans for capital construction, for commissioning production capacities and fixed capital as foreseen by the five-year plan for the planning year, on the volume of contracted jobs, on title lists of carried-over and newly begun construction projects, and appropriately approved planning-estimate documents pertaining to these construction projects. Client production associations, enterprises, and organizations write out their proposals for construction and installation volume, in terms of both commercial construction output and contracted jobs (record-orders drawn up on form No 4-PKS); they submit these proposals to the production construction-installation associations and trusts (or other contractor organizations equivalent to them).

These proposals are reviewed by the contractor construction organizations together with the clients.

Basing themselves on the reviewed record-orders, the clients and contractors draw up draft plans of commercial construction output, they

determine the volumes of contracted jobs, and they submit them to their superior organizations (together with appropriately filled out record-orders).

Attention should be turned to the fact that after the switch is made to the new order of construction production planning, writing plans for the clients and contractors at the basic administrative level will become an extremely important phase of work on the plan as a whole. As we can see from the example given above, all data required for the computations may be obtained only from documents written up by the primary organizations, which have the information necessary for this. Organizations at all administrative levels must be constantly aware of this.

The Directives define the order of drafting commercial construction output plans and coordinating upon summary record-orders at the intermediate administrative level, as well as at the level of the USSR and union republic ministries and departments. It is basically similar to the presently existing order of planning contracted construction and installation. At the same time a number of new provisions are foreseen.

Thus the Directives establish that union-republic ministries of the union republics that play the role of contractors must submit draft summary plans of commercial construction output and of contracted job volumes both to the USSR union republic ministry to which they are subordinated and to the council of ministers of the appropriate union republic.

In order to tie in the plans of capital construction with the output capacities of construction organizations and the labor resources available, the union republic councils of ministers draw up, and submit to the USSR Gosplan and the appropriate USSR ministries, draft five-year and annual plans of contracted jobs to be performed by the union republic ministries of these union republics. These draft plans are reviewed by the USSR Gosplan when it develops the plans for contracted jobs, simultaneously with the draft plans submitted by USSR ministries involved in construction and installation.

In contrast to the presently existing order of contracted job volume planning, according to which USSR ministries and departments and union republic councils of ministers intending to allocate capital investments on the basis of proportionate participation must foresee the appropriate volumes of contracted jobs for these purposes in the proposals (orders) submitted to contractors, in the case of planning commercial construction output volume on the basis of construction projects requiring proportionate participation, output volumes are determined in all stages of the draft plan's development for only one organization--the principal builder, and for the contractor, on the basis of the volumes of proportionate capital investments and the deadlines of construction and installation jobs foreseen in the planning documents. Upon approval of the plan, the commercial construction output volume is determined concretely on the basis of the deadlines foreseen in the draft plan for commissioning the output capacities and facilities, with a consideration for the actual volumes of construction and installation jobs done.

Approved plans of commercial construction output and the established volumes of jobs to be contracted out are submitted to USSR ministries and departments in construction and installation, and to union republic councils of ministers, which on this basis approve, and submit to subordinated construction and installation organizations in the established order and at the established time, the volumes of commercial construction output related to enterprises and facilities to be surrendered to clients, the total volume of commercial construction (distributed among the clients), and the volume of commercial construction done through internal resources (broken down quarterly in annual plans); they also establish, for these organizations, the total contracted job volume (broken down in relation to individual clients) and the volume of contracted jobs done through internal resources.

In correspondence with the commercial construction output volumes established for client union republic USSR ministries in the plans of the ministries and departments involved in construction and installation, these clients communicate the volumes of commercial construction output to the union republic ministries and departments, broken down in relation to construction projects, facilities, and executors; the client ministries also approve the assignments for commercial construction output volumes intended for directly subordinated production associations, enterprises, and organizations.

The commercial construction output volume assignments for production associations, enterprises, and organizations subordinated to union republic ministries and union republic departments are approved by these ministries and departments on the basis of the volumes communicated to them by superior organs.

Similar indicators are approved for union-level associations, enterprises, and organizations directly by the USSR ministries and departments.

The order of approving commercial construction output volume assignments for production associations, enterprises, and organizations subordinated to republic ministries and departments is established by the councils of ministers of the union republics.

In this case the Directives emphasize that approved commercial construction output volumes and the volumes of contracted jobs set for individual construction projects and facilities must correspond to the volumes coordinated upon in the record-orders and, in the event of discrepancies, to the volumes adopted by higher administrative levels and the USSR Gosplan.

The Directives also foresee a way to change approved annual plans of commercial construction output for specific construction projects and facilities in connection with the results of plan fulfillment in a previous year.

In conclusion we would like to emphasize the special importance of having the planning work pass through all stages, from the basic administrative level to the level of the USSR ministry or department, or the union republic Gosplan, so as to insure that each indicator would be determined well at all levels of construction administration.

Presence of the required planning-estimate documents and accounting data that would insure the validity of the plan's indicators is of no less importance to the writing of the plan.

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Crediting Unfinished Production

Moscow *Ekonomika Stroitel'stva* in Russian No 6, Jun 80 pp 29-33

[Article by Cand Econ Sci V. I. Zhuravleva, chief economist, Economic Planning Administration, USSR Stroybank, and P. I. Dibinskaya, Chief, Contracting Organisation Financing and Credit Administrative Division: "Crediting Unfinished Construction and Installation Jobs in the Calculation of Commercial Construction Output"]

[Text] Adopted by the CPSU Central Committee and the USSR Council of Ministers on 12 July 1979, the decree "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality" signifies a new stage in improvement of the economic mechanism. Among the mutually associated economic measures foreseen by the decree and directed at accelerating the commissioning of output capacities and facilities and at raising the effectiveness of capital investments, bank credit plays an important role.

The tasks imposed on the bank system by the present level of economic development require creation of a mechanism which would stimulate construction via the credit channel with the goal of attaining the best results in construction, accelerating the turnover of working capital, and reinforcing the principle of cost accounting (*khozraschet*).

Differentiation of the bank's credit relationships with loan recipients is becoming the foundation of this mechanism; it foresees not only expansion or limitation of credit relationships depending on the results of the activities of business organs, but also change in the organizational forms of crediting themselves.

As we know, in distinction from the previous order, accounts are now settled between client and contractor only for fully finished construction and for enterprises, pilot complexes, sections, and facilities that are prepared for production and for the rendering of services; these accounts are handled on the basis of the estimated cost of commercial construction output. Clients will also settle with planning and research organizations on the basis of fully finished plans, accepted by them, for construction of enterprises, pilot complexes, sections, and facilities.

Because of the transition to payment for commercial construction employing enterprises, pilot complexes, sections, and facilities ready for operation as the units of payment, the outlays of construction and installation organizations will significantly grow in terms of unfinished commercial construction output pertaining to facilities to be surrendered to the client at strictly specified times.

The decree has made fundamental changes in the composition of the sources of working capital enjoyed by contracting organizations and by planning and research organizations. Temporary advances of working capital by clients to cover outlays on unfinished jobs is to be stopped; instead, this working capital is to be acquired mainly through bank credit. Naturally, under these conditions the order of crediting outlays on unfinished jobs will be changed as well.

The USSR Srobybank wrote, and on 8 February 1980 it approved new instructions on providing loans to contracting organizations, establishing the order of furnishing various bank loans to contracting construction-installation and other organizations. It places special emphasis on the way to credit unfinished production when settling accounts for commercial construction output.

Inasmuch as the crediting of such work is becoming the principal form of loans provided to contracting construction and installation organizations, it is very important to correctly understand the essence of the mechanism for crediting such outlays.

The new order of crediting outlays on unfinished construction and installation is based on the results of an experiment conducted since 1976 by the Belorussian SSR Ministry of Industrial Construction and the Belorussian SSR Ministry of Installation and Special Construction Work, in which the work of contracting organizations was credited prior to the commissioning of finished enterprises, pilot complexes, sections, and facilities readied for production and for the rendering of services. This experiment was a part of an integrated economic experiment conducted in recent years in nine major subdivisions of construction ministries and one main administration of the Moscow City Executive Committee.

The experience showed that introduction of accounts for commercial construction output and of the crediting method to cover the outlays of contracting organizations associated with unfinished construction and installation will promote completion of the planned assignments for the commissioning of output capacities and facilities, completion of the plans for commercial construction output, and reduction of construction time. The financial status of contracting organizations, which formerly depended significantly upon the financial status of the client, will improve in the new conditions, and cost accounting in the construction organizations acquires a sounder foundation.

At the same time the mechanism for crediting contracting organizations, based on the experience of previous years and the results of the Belorussian experiment, reflects a higher level of development of the bank's credit relationships with contracting organizations, one corresponding to the present phase of economic development in construction.

We should turn our attention first of all to the fundamental changes that were made in the way outlays on unfinished production are credited in accordance with the new decree.

The principle of continuous crediting of unfinished construction, which was tested out extensively by the Belorussian SSR Ministry of Industrial Construction and the Belorussian SSR Ministry of Installation and Special Construction Work, enjoyed further development over a period of a number of years. What this principle means is that when the planned deadlines for commissioning an enterprise, pilot complex, section, or facility expire, the bank does not seek repayment of an issued loan, instead continuing the crediting process, though under special conditions--exactng a higher percentage for the loan.

In order to cover the outlays of contracting construction and installation organizations made between periods of adjustment of credit for outlays on unfinished production, a standard amount of working capital is set for them, equaling up to 10 percent of the annual volume of work done through internal resources. This standard amount must be provided out of the organization's own working capital intended for this purpose, and any amounts still lacking are to be provided through a bank loan.

The order of crediting outlays on unfinished work done by construction-installation and planning-research organizations has been unified.

Now that accounts are to be settled for commercial construction output, the time that the working capital of construction organizations is tied up in the production stage has grown longer. Investments of working capital into outlays on unfinished construction grow accordingly, since this capital may be released only after assets are obtained from clients for commercial construction output.

Thus it would be a long interval of time before a contracting organization would have access to working capital for a new cycle in production turnover--that is, to pay for material valuables replacing those invested into production, to settle the wage account, and to cover other outlays.

With the credit method for covering outlays on unfinished construction and installation jobs, the bank will compensate for these outlays at particular time intervals, at times of credit adjustment. However, in the periods between credit adjustment the contracting organization may experience a shortage of assets to cover outlays, or it may place significant amounts of payment loans into the turnover, thus using these loans for other than their intended purpose and, moreover, pay higher interest for them.

According to the previous order, credit was extended only as compensation for production outlays within a 10-day credit adjustment system. In accordance with the new instructions, at the beginning of the year the construction and installation organizations will be loaned money to form the standard amount of working capital, so as to cover outlays between credit adjustment periods. The size of the standard amount must correspond to the periodicity of adjusting credit for unfinished work (once or twice a month).

Assets equal to this standard amount must constantly be within the turnover of the contracting construction organization, since this follows from the very nature of this standard. This situation is achieved in a practical sense through the fact that the standard amount of working capital to cover outlays between credit adjustment periods is not considered as one of the year's sources of capital when issuing loans for unfinished production and inspecting their disbursement.

On the last working day of the year, all sources are brought into balance with the amount of the credited outlays by a special adjustment, and at the beginning of the next year credit is released to contracting construction and installation organizations in an amount determined by computation in order to form the standard amount of working capital.

Changes were also made in the previous order in regard to the periodicity with which credit for outlays on unfinished work is adjusted. The instructions foresee that this credit is extended as a rule twice a month, on the 1st and 16th, on the basis of adjustment results. In certain cases a special adjustment may be made on petition of the contracting organization. As had been the case before, whenever adjustments are made the credited outlays must be brought into balance with the sources covering them.

At the same time, the loan account opened as a means for crediting unfinished production will now be a mixed account--that is, it will reflect outlays on unfinished construction themselves, the cost of work done on enterprises, private complexes, construction stages, facilities, and complexes of jobs which are finished and surrendered to clients (general contractors) and which require the drafting of accounting documents, and the cost of jobs associated with completed and surrendered enterprises (facilities) and complexes for which the accounting documents have been submitted to the bank within deadlines established for this purpose.

This will make it possible to satisfy the organization's need for working capital more fully, and it insures transformation of credit from one form into another in accordance with the movement of the contracting organization's working capital, which will insure economization of credit resources, widen the bounds of bank influence upon the business and financial activities of credited organizations in the process of credit extension, and reduce the amount of paperwork required in setting up a loan.

Credit could have been extended for the time required to draft accounting documents for facilities and stages of work turned over to clients in the previous conditions as well, but only in individual cases.

This limitation has now been removed, and the maximum time for drafting the accounting documents has been changed. In order to stimulate faster payment for commercial construction output and, on this basis, the turnover of the working capital of organizations receiving credit, the cost of such work is accepted as a creditable item on the condition that the accounting documents for completed commercial construction are drafted or submitted to the bank for encashment not later than 5 working days after the production capacities or facilities are accepted for operation. In the necessary cases the deadline for submitting accounting documents to the bank can be extended to compensate for mail delivery time, or the time required to convey them from the site of the work.

If contracting organizations comply with this condition, they receive credit until such time that assets are received from clients (general contractors). In this connection credit will no longer be extended separately on the basis of accounting documents for completed work that are enroute.

When the accounting documents are not delivered to the bank within the time indicated above, the outlays of contracting organizations associated with output capacities or facilities placed into operation are excluded from the consideration of credit for unfinished work.

Let us dwell in greater detail on the deadlines and conditions for extension of credit.

Credit for outlays on unfinished production made by general contracting construction-installation organizations that settle accounts with clients for commercial construction output, as well as by subcontracting organizations doing contracted installation of basic production and power supply equipment on the basis of a set deadline for the commissioning of output capacities and facilities, is extended prior to the planned deadline for the commissioning of fully finished enterprises, pilot complexes, sections, and facilities readied for production and for the rendering of services.

All other subcontracting construction and installation organizations, as well as specialized planning organizations, can use bank credit to cover outlays on unfinished production prior to the planned deadlines for surrender of finished complexes of specialized jobs to general contracting or planning-research organizations.

But if contracting organizations violate the deadline for turning over commercial construction projects to clients, the extension of credit for outlays on unfinished production is no longer halted, as had been the situation before; instead, credit is still extended, but under stiffer

conditions--higher interest is charged for the loan. Debts associated with loans used to cover outlays on unfinished work at enterprises and facilities and complexes of jobs that are not completed by the deadline by subcontracting organizations, as well as uncompleted plans, are reflected in a separate loan account. In this case the planned deadlines for the time of loan extension to cover outlays on unfinished work is determined on the basis of the deadline for commissioning the enterprises, pilot complexes, construction stages, and facility foreseen in the title lists of the construction site, on the basis of the deadline for submitting plans to clients in accordance with planning and research contracts, and on the basis of the deadlines for finishing complexes of jobs described in contracts signed with subcontracting organizations for which deadlines for placing output capacities and facilities into operation are not set.

It should be kept in mind that according to the 12 July 1979 decree of the CPSU Central Committee and the USSR Council of Ministers the title lists of construction sites are mandatory planning documents that must be considered throughout the entire period of construction, documents that are binding upon clients, contractors, planning, financial, bank, and supply organs, and equipment and structure suppliers.

In order to account more fully for the need an organization might experience for credit, the instructions foresee that general contracting construction and planning organizations can receive bank credit for outlays on unfinished work being done through their internal resources, as well as for work done by subcontracting organizations, and complexes of jobs paid for or accepted for payment by general contractors and involving enterprises, pilot complexes, construction stages, facilities, and plans not yet surrendered to clients, inasmuch as prior to completion of construction or planning and surrender of the work to clients, outlays on these complexes of jobs are accounted for as unfinished production in the balance of the general contracting organization.

After the general contracting organization accepts the accounting documents of subcontracting organizations for finished complexes of jobs, it pays the latter off out of its current account, and if funds are lacking it obtains the money from the appropriate loan accounts, opened as a means to cover outlays on unfinished production on credit, depending on whether or not the planned deadlines for submitting commercial construction or finished plans are met.

When extending credit for outlays on unfinished work, the size of the loan granted also accounts for work equivalent to 5 percent of estimated cost, completed but unpaid by clients, in housing and municipal facilities accepted for operation prior to vegetation of the appropriate internal territories as required by the temperature and climatic conditions, and before building approach roads are paved and sidewalks and maintenance areas are installed. To stimulate faster completion of such jobs, credit is extended for the shortest acceptable time required for their completion, as

prescribed in the acceptance document of the state commission, but not later than the second quarter following the year of the facility's commissioning.

At the same time in order to monitor compliance with state planning and financial discipline in construction, outlays on unfinished construction, installation, planning, and research associated with enterprises, pilot complexes, construction stages, and facilities, and complexes of specialized jobs that are not included in the plan, that are associated with halted construction or planning, that are not supported by planning-estimate documents, and that are not accepted by the bank for financing are not accepted for credit extensions.

The resources for covering credited outlays that are considered include the organization's own working capital available to cover outlays on unfinished work, in an amount exceeding that required to cover these outlays between credit adjustment periods, loan indebtedness to the bank for unfinished production, and short-term indebtedness of subcontracting organizations for complexes of jobs that they have finished and which have been accepted by the general contractor.

Thus the crediting of outlays on unfinished production begins with the act of advancing funds for the completion of this work, and it goes on until funds for finished construction are received. Naturally, in addition to causing a significant increase in the proportion of credit contained within sources to cover outlays on unfinished production, this circumstance should have change in the order of loan payment as a consequence.

In distinction from the previous order, where loans were paid off out of the current account of the organization receiving credit, on the basis of the planned deadlines for surrendering facilities and work stages to a client, in a sum corresponding to the proportion of credit among the sources covering planned outlays on unfinished production, the new instructions foresee that loans are to be paid by deducting assets received from clients for finished construction (planning) output or from general contractors for completed jobs, directly into loan accounts intended to cover outlays on unfinished jobs. This method of loan payment insures prompt and full repayment.

The security of loan indebtedness is determined from the balance in the same way that credit adjustments are made in operating accounts.

In order to bring the flows of the credit and working capital of credited organizations more in line with each other and to determine more accurately the security behind issued loans in their sum total, the inspection of the security behind loans to cover outlays on unfinished jobs must be performed simultaneously with the inspection of the security behind other loans to cover the cost of material valuables or outlays falling within a particular period of time, and the results of this inspection should be reflected in the appropriate accounts in balance form.

The 12 July 1979 decree of the CPSU Central Committee and the USSR Council of Ministers foresees that assets released by clients in connection with the transition to maintenance of accounts without intermediate payment are to be used as resources with which to credit outlays on unfinished production; this includes credit for formation of the standard amount of working capital. This presupposes a need for intensifying bank control not only in relation to the disbursement of loan assets but also in relation to accumulation of crediting sources. In turn, work done by the bank to mobilize credit resources will promote better planning of financial sources supporting capital investments, and their faster entry into special accounts maintained at bank institutions. When a client is temporarily lacking funds, he can be offered credit for a period of up to 45 days on the basis of special accounts.

Expansion of credit ties with contracting organizations and enlargement of the volume of investments on credit make it necessary to intensify bank control and raise the level of the bank's economic functions. Bank control is founded on a differentiated approach to crediting--that is, to extending privileges and imposing sanctions.

The principle of differentiation of credit relationships existing between a bank and business organs has been in effect throughout the entire history of the bank, but the criteria by which the activities of credited organizations are evaluated change in accordance with the requirements of the concrete phase of economic development.

The main indicators used today to evaluate the economic activity of construction and installation organizations are the results enjoyed in the commissioning of output capacities and facilities, the commercial construction output, and growth in labor productivity and profit.

Satisfaction of these highly important requirements of the plan is what must be stimulated by the bank's credit mechanism, which will promote growth in the effectiveness of construction.

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Estimated Rates, Prices

Moscow EKONOMIKA STROITEL'STVA in Russian No 6, Jun 80 pp 57-61

[Article by Yu. I. Malimanov, deputy chief, USSR Gosstroy Division of Estimate Norms and Price Setting in Construction: "Transition to New Estimate Norms and Prices in Construction"]

[Text] The system of estimate norms and price setting operating in construction is based on many years of experience in the planning of buildings and structures, and their construction. The methods of price setting and determination of the estimated cost of construction are directly related to the fundamental principles of construction planning and financing and of determining the most important indicators of the economic activities of contracting organizations.

The significance and functions of estimate documents were pointed out back in 1969 in decrees of the CPSU Central Committee and the USSR Council of Ministers concerned with capital construction. It was established that the estimate must take the form of a document to be used as the basis for planning capital investments, for financing construction, and for settling accounts between contractors and clients for work done. In addition the estimate must serve as the basis for reinforcing the practice of cost accounting in construction, and it should be used as a means for evaluating the activities of contracting organizations and clients.

In order that estimate documents would satisfy these requirements, they must contain all of the information necessary for this. In this case each of the functions of the estimate require that it contain data of diverse volume and content. The greatest volume of information is needed by construction and installation organizations, which use the estimate documents for internal planning of the activities of their construction sections, construction and installation administrations, and trusts. What is needed here is information on the volumes of different types of jobs so that they could be distributed among executors, on consumption of material resources, on the total wages and labor outlays foreseen by the estimate, and on the need for construction machinery and mechanisms, as governed by the nomenclature of the estimate norms.

Despite the fact that estimate norms were developed primarily as a means for determining job costs and although the data they contain are only averages, contracting organizations make extensive use of these norms in their planning.

The existing instructions on arriving at plans and estimates foresee an optimum volume of estimate documents, though this volume could be reduced significantly in construction planning and financing, as well as in the handling of payments for completed work.

The bulk of the construction and installation performed in the country is done by contracting organizations, all of the economic activities of which are based on the principles of cost accounting (khozraschet). In this case practically the sole source of funds to support the economic mechanism of construction and installation organizations is the assets obtained from clients upon payment of completed work, precisely in accord with the approved estimate documents.

One more important requirement on estimate standards and estimates follows from this premise--maximum possible accuracy and dependability of construction cost determinations. Estimate documents must include within themselves the funds necessary to compensate for all outlays of contracting organizations and clients on construction.

Considering the constantly growing volume of capital investments and evolution of estimate standardization and price setting in construction in our

country, scientists and specialists in estimate affairs and planning came to the conclusion that we must abandon the methods of individual estimation of the cost of each facility, existing since the beginning of the 1950's, and switch to centralized development of nationwide estimate standards binding upon all ministries and departments involved in the construction of enterprises, buildings, and structures intended for productive and non-productive purposes in different regions of the country.

Concurrently in order to stabilize the level of cost estimator, planning indicators, and the comparability of accounting data, it was recognized necessary to keep the level of estimate norms and prices constant over a sufficiently long planning period. This method for arriving at cost estimates has been used in our country for almost 3 decades, and it has justified itself fully.

This system of estimate norms, prices, and the rules of their use when writing up estimate documents insures unity in the methodological principles behind computation of cost estimates, behind the planning of capital construction, and behind determination of the basic indicators of the economic activities of contracting organizations. The system is unique in that by insuring stability of estimate norms and prices and comparability of planning and accounting indicators over a longer period of time, it permits construction-installation organizations and enterprises supplying all forms of material resources to settle their accounts on the basis of wholesale prices effective at the time of settlement--that is, on the basis of current prices. The difference between wholesale prices used in arriving at estimated prices and the current wholesale prices are considered in the planning of the profit of contracting organizations. If for example wholesale prices on some particular construction materials rise, the contracting organization pays suppliers for them on the basis of wholesale prices that are higher than those in the estimates, used to keep records on the work done, and thus they suffer a loss that has nothing to do with the results of their activity. In order to compensate such unjustified losses, planning organs reduce the amount of planned profit for the appropriate organizations, and the sum they must contribute to the state budget. In the event that wholesale prices drop, planned profit and deductions into the budget are increased correspondingly. This method of accounting for price deviations, based on centralized adjustment of financial and planning indicators of the economic activities of construction and installation organizations, makes it possible to maintain estimated prices at a stable level for a sufficiently long period of time, and to preclude the need for updating and re-approving estimate documents whenever changes occur in current wholesale prices, rates, or other elements making up cost.

While it is relatively easy to account for fluctuations in wholesale prices, changes in other factors influencing the estimated cost of construction often do not yield to control. Such factors include:

In estimated prices--changes in transportation outlays elicited by appearance of new enterprises supplying materials, structures, and articles or by deactivation of existing suppliers, and specialization of production at construction industry enterprises;

in estimate norms--use of construction machinery and mechanisms differing from those adopted in the norms, improvement of the organization and procedures of construction, use of new materials and structures, of new standard planning concepts, and so on.

All of these circumstances influence the outlays of contracting organizations and the cost of construction to one degree or another. As long as these deviations are not great, they do not have a noticeable influence on the economic activities of the organizations. With time, deviations in the prices on material resources as well as other factors dependent upon scientific-technical progress both in the construction sector and in associated sectors supplying products used in the erection of buildings and structures begin to significantly influence the economic indicators of the activities of the builders. The longer estimate norms and prices are not reviewed, the greater the deviations accumulate and the greater becomes the gap between the cost estimates and the actual cost of construction.

Experience shows that estimate norms and prices may remain in existence without adjustment for about 10 years. This is the optimum time, during which the changes indicated above do not exceed the permissible limits, and the profitability of the contracting organizations does not fall below the norms of planned accumulations (standard profit).

It is also unsuitable to review estimate norms and prices more often than once in every two five-year plans, since it takes not less than 3 years to perform such a complex, laborious, and expensive function, which requires the participation of many planning and scientific research organizations falling within many ministries and departments.

As we know, the system of estimate norms and prices used as the basis today for determining the estimated cost of construction has been in effect since 1 January 1969. The estimate norms for construction jobs (Part IV, SNiP [Construction Norms and Regulations]), used as the basis for the collections of regional unified unit cost rates (YeRYeR), were introduced on 1 January 1965. Considering that their writing required about 3 years, the norms contain data corresponding to the technical level of construction typical of the early 1960's. Thus the presently existing estimate norms for general construction and special jobs have been in existence for 18 years already, and of course in many ways they fail to satisfy modern requirements associated with construction organization, the methods of the work, and the sophistication of the equipment available to contracting organizations.

Estimated prices on construction materials, articles, and structures used today were determined on the basis of wholesale prices and rates introduced

on 1 July 1967. Transportation outlays considered within these estimated prices were determined on the basis of the transportation systems and cargo carrying rates applicable to different zones of the country in 1967.

The statistics indicate that in the present five-year plan, the profitability of construction organizations has exhibited a general declining trend. Of course it would be incorrect to explain this only by the influence of price setting factors, though their influence doubtlessly has great significance.

In order to partially compensate for the outlays of contracting organizations resulting from the rise in wholesale prices on construction materials and other forms of industrial products following 1 July 1967, from changes in the system for transporting cargo, and other factors, a decision was made to compensate for these outlays by a number of construction ministries beginning in 1980, prior to transition to the new estimate norms and prices in construction. These outlays must be compensated by assets foreseen in the state budget, without including them in the volume of completed work.

All of the circumstances enumerated above doubtlessly indicate an urgent need for introducing new estimate norms and prices in construction.

As was noted earlier, the transition to new estimate norms and prices requires complete reworking of the entire system of estimate standards: the estimate norms for construction and installation jobs, the estimated prices of local and imported materials, the collections of unified unit cost rates, the price lists for equipment installation, the machine-hour, construction machinery, and mechanism price lists, the norms of overhead expenditures, planned accumulations, and outlays on temporary buildings and structures, the norms of outlays associated with construction and installation performed in winter, and other estimate standards.

Introduction of new estimate norms and prices into construction is always preceded by a reworking of wholesale prices and rates in industry. New wholesale prices on industrial products will be introduced, as we know, on 1 January 1982. It is then that the possibility will arise for completing the preparation of new price estimates for construction materials and articles, and other estimate standards including cost factors.

The transition to the new estimate norms and prices in construction is to be completed as of 1 January 1984. Preparations for this transition have already been going on for several years. The hardest and most important part of this effort is the writing of a new Part IV for the SNiP "Estimate Norms and Regulations." In contrast to that existing today, which is essentially a collection of estimate norms on construction jobs, the new Part IV of the SNiP is being created as a summary of the basic methodological premises and rules applicable to estimation practices and price setting.

All 16 chapters of the new SNiP Part IV will be completed this year, and more than half of them are being written for the first time. Also nearing

computation is the preparation of the raw data for new collections of prices on equipment installation. For the first time in the history of the creation of such standards, they will be calculated for computers.

Organizational and preparatory work is being done today in the republics, kraye, and oblasti--raw data are being collected with the purpose of developing the transportation systems for conveying local and imported construction materials from supplying enterprises to the places of their consumption. Interdepartmental commissions are being created to manage this work, and institutes that are to collect, process, and classify all of the raw data are being earmarked.

The new system of estimate standards is being developed in full correspondence with the requirements of the first, second, and third parts of the construction norms and regulations, and it accounts for the latest achievements in construction procedures and organization, the present level of the equipment availability at the construction organizations, and application of new types of construction materials, and progressive structural and space-planning concepts for buildings and structures.

The transition to new estimate norms and prices in construction is a complex and laborious task that can be completed successfully only through the joint, coordinated efforts of many union ministries and departments, and republic organizations.

Preparations are now being made of a number of procedural directives and standards documents. Thus directives on the order for arriving at new estimated prices on construction materials, articles, and structures must be approved by 1 December 1980, and the conditions and distances of transportation of local construction materials must be determined in the republics, kraye, and oblasti prior to 1 October 1981. Prior to 1 July 1982, these data will be used as the basis for developing and improving estimated price lists for local construction materials, articles, and structures, taking account of the new wholesale prices on industrial products and the rates of cargo conveyance. These price lists will be used as the basis for tying in local construction conditions with the regional unified unit cost rates that are arrived at centrally (the work is to be completed prior to 1 November 1982). Timely coordination and approval of the collections of regional unified cost rates will make it possible for the ministries, departments, and councils of ministers of the union republics to begin switching to the new estimate norms and price lists for the construction of buildings and structures, the collections of summary estimate norms, and other standards documents necessary for the recomputation of objective estimates, and to approve all these documents prior to 1 January 1983. Recomputation of objective estimates for the volume of work to be done in 1984 must be completed by 1 July 1983.

In parallel with this work, methodological directives will be prepared and the remainder of the estimated cost of construction and installation jobs

and of equipment installation based on summary construction site estimates to be carried over into 1984 will be recalculated on the basis of the new prices, as will work started in this year. The estimated cost of construction and installation jobs will be recalculated by a simplified method, with the help of specially developed and appropriately approved indices, while the estimated cost of equipment will be determined by direct computation using the new wholesale prices, on the basis of each particular form and type of equipment. All of the stages and deadlines of this complex, important work have been coordinated in such a way as to insure prompt writing of the plan for capital construction in 1984 in all sectors of the national economy and industry, on the basis of estimate documents recalculated to reflect the new estimate norms and prices.

The CPSU Central Committee and USSR Council of Ministers decree "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality" imposes new, important requirements on the entire complex of issues associated with preparations for introduction of the new estimate norms and prices into construction. In the 11th Five-Year Plan, as we know, according to this decree we must complete a gradual transition to the planning of labor productivity in construction and installation organizations on the basis of net output (standardized) or some other indicator that reflects more precisely the changes in labor outlays, while the wage fund is to be determined from an output ruble standard based on the indicator adopted for planning labor productivity. It follows from this that the entire estimate standard base used to determine the estimated cost of construction must insure a possibility for singling out conditional net output in the estimates. The task is made more complicated by the fact that it must be singled out not only from the estimate standards being written today for use as of 1 January 1984, but also from the entire system of estimate standards presently in effect.

The necessary organizational steps have been taken to insure prompt completion of this work. The composition of outlays contained within the standard conditional net output of construction has been determined, the formats of the estimate documents have been reworked, the standard conditional net output is being singled out from the norms for overhead expenditures and additional outlays associated with performance of construction and installation jobs in winter, and with outlays on temporary buildings and structures, and from a number of other standards that are associated with estimates and which have a bearing on the estimated cost of construction and installation.

The fundamental premises defining the methodological approach to singling out standard conditional net output in the estimate and in the existing system of estimate standards will also be considered when developing estimate documents to be made effective as of 1 January 1984, at the time of transition to the new estimate norms and prices in construction.

Concurrently with preparation of the estimate standard base of the planning of labor productivity in construction and installation organizations, sector

correction factors applicable to existing estimate norms for construction and installation jobs and the norms of overhead expenditures, used to determine the estimated cost of the jobs associated with reequipment and reconstruction of existing enterprises, have been developed and approved, and they will go into effect on 1 January 1981. These factors are intended as a means for compensating the contracting organizations for additional outlays elicited by work done at operating enterprises without interrupting production for these purposes, by the impossibility of utilizing highly productive construction equipment, by crowded conditions at the construction sites, by presence of a developed network of existing utility and underground lines, by intense traffic within the plant, by limited room for storage of construction materials, articles, and structures, and by the associated need for additional shipments. These factors also account for the fact that the overhead of contracting organizations increases when enterprises must undergo reconstruction and reequipment. If we use the new upward-adjusting factors together with those applied to estimates in accordance with the "Directives on Using the Regional Unified Unit Cost Rates for Construction Jobs" (YeR-69), the cost of construction and installation jobs done prior to reconstruction and reequipment of enterprises will increase by an average of 11-13 percent, in comparison with the cost of jobs associated with new construction under normal conditions.

The USSR Gosstroy is to develop new lists of wholesale prices on reinforced concrete articles, lightened asbestos-cement articles for housing and municipal construction, and on aluminum construction structures and articles. The drafts of the first two price lists are to be submitted to the USSR State Committee for Prices prior to 1 November 1980, while the draft price list for aluminum construction structures and articles is to be submitted by 1 January 1980. In this case the standard net output must be singled out from prices on all types of articles contained within the price lists. A great deal of organizational and preparatory work has been done in order to successfully and promptly solve this problem, before the plan of standard jobs for the current year is written: Institutes responsible for developing each price list have been determined, and the schedules setting the deadlines for completion of individual phases of the work have been approved. The institutes and the USSR Gosstroy have designated individuals responsible for the quality, completeness, and timeliness of the development of the price lists, and for singling out the standard net output within them.

Solution of the entire complex of problems associated with introducing the new estimate norms and prices into construction, with reorganization of wholesale prices, rates, and transportation systems, and with transition to the planning of labor productivity on the basis of standard conditional net output will create, together with implementation of other measures, the prerequisites for reorganizing the entire economic system of construction, as well as promote a growing together of the estimated cost of construction and the socially necessary outlays corresponding to the present level of technical progress within the sector.

VARIOUS APPLICATIONS OF NUMERICALLY PROGRAMMED CONTROL

Moscow Grinder Plant

Moscow MASHINOSTROITEL' in Russian No 10, Oct 79 pp 5-7

[Article by M. D. Shteyngart: "Glorious Anniversary"]

[Text] The Moscow Grinder Plant celebrates its 100-th birthday this October. The plant is one of the leading machine tool manufacturers of the nation and is numbered among the founders of Soviet precision machine tool building. Today the plant is a very important technically perfected modern enterprise that develops and produces highly productive and highly accurate surface, gear, slot and other types of grinders. It is a leader in our nation in the production of these machine tools, and at the same time it is helping other plants to master production of these machines. The machine tools that have been developed and produced by the plant have been widely acclaimed both in our nation and elsewhere. The best models have won numerous prizes in Soviet and international exhibitions, including gold and silver medals.

The history of the enterprise is rich with revolutionary, heroic and labor traditions. When we look at this modern plant today, equipped with the latest technology, it is difficult to imagine that at one time, before the Revolution, it was a very small shop that made oil tanks and vessels, machines for filling cigarette wrappers and corking wine bottles, rather than complicated machine tools.

The early enterprise was known for poor working and living conditions, cruel exploitation, and it is no wonder that there were frequent strikes and walkouts, and that this plant became a focus for the revolutionary struggle. In response to the bolsheviks, a working committee of the Party was organized at the plant, headed by P. Baykov, a lathe operator who played an enormous part in shaping the revolutionary outlook of the workers and the proper understanding of the tactical line of the Party. It was at his initiative that a detachment of the Red Guards was set up at the plant, headed by Bolshevik Ye. K. Pandratov. This detachment took a very active part in the struggle to establish Soviet leadership.

After the victory of the October Revolution, as well as in the course of the first Five-Year Plans, the plant was busy making printing equipment,

repairing steam engines and railroad equipment, and then in accordance with its own plans the plant mastered the production of shapers and slotters, becoming the sole manufacturer of these machine tools. And this mastery and production of goods manufactured "in accordance with its own plans" became one of the main production traditions of the collective, so that during the developmental years a great number of new machine tools were developed, including many original ones.

In 1935 the plant developed a design and mastered production of a whole series of surface grinders with horizontal and vertical spindles that were used to equip the machine building sectors that were developing in the years of the early Five-Year Plans, considerably reducing the import of grinders from abroad. Up to 1964 the plant was making 90% of all the surface grinders in our nation. Later the plant turned over the production of these machines to the Voronezh Plant in the Fiftieth Anniversary of the Leninist Komsomol, and to the Lipetsk Machine Tool Plant, and assisted them in mastering production.

During World War II, the plant designed and produced dozens of machine tools for the defense industry. Many of the plant workers were directly involved in battles for freedom and independence of the motherland. One hundred thirty of them lost their lives, and their names are inscribed on a marble obelisk on the plant grounds. Former workers of the enterprise, Ts. L. Kunikov and P. P. Merinkov, have been decorated as Heroes of the Soviet Union.

After the war, the plant began manufacturing more than twenty models of original machine tools of various classifications in addition to the production of grinders. A group of designers at the plant (K. A. Samoylov, V. A. Bazilev and others) won the State Prize of the USSR for designing and making automatic machine tools for machining the blades of agricultural machinery.

In 1945 the plant developed a high-speed grinding technique that was widely acclaimed both in the Soviet Union and elsewhere. The originator of this technique, Komsomol Youth Brigade leader P. B. Bykov was also awarded the State Prize of the USSR. By using this new technique he was able to meet six annual quotas in a year and 25 annual quotas over the Five-Year Plan. The introduction of high-speed cutting has saved the State 700 million rubles a year. An engineering college and vocational training school have been set up and put into operation at the plant to improve the skill of workers.

In 1949 the plant was the first in the Soviet Union to develop and master production of slot grinders (today it is the sole manufacturer of these machines), and in the fifties production was started on a new kind of tool -- gear grinders. Because of the high precision and complexity of these machines, a number of difficult problems had to be solved, and they

were. In 1963, the enterprise was rebuilt, and a thermostatically controlled building was put into operation with unique equipment enabling series production of precision and high-precision gear grinders, including those for tool production. The model 5851 and model 5853 gear grinders are as good as non-Soviet machines in accuracy, productivity and manufacturing quality. This has made it possible for us to stop importing these tools.

The Tenth Five-Year Plan was especially productive. During this period the collective made special machines for the motor vehicle industry, an original high-productivity continuous broaching machine for making turbo-jet engine vanes, tools for machining bevel gears, rings for instrument bearings, silicon and ceramic plates, disposable hard-alloy cutters and diamond tools. Work is now being done on mastering the production of precision machine tools with adaptive, cyclic and numerical preset control.

During its work life the plant has met the high quotas of the ministry, and in this way has assisted in providing modern metal-cutting equipment for all important sectors of industry. Since 1937, the collective of the plant has designed and mastered production of more than 300 models of machine tools of various classifications. In addition, they have mastered production of several dozen models of machine tools designed in other organizations. In a single year the plant produces 20-30 models, of which 5-10 are new ones. The production of special machine tools makes up nearly 50% of their output. About 60 author's certificates and five patents have been granted for the design of machine tools and control systems developed at the plant; 22 machine tools have won medals in competition at the Exhibition of Achievements of the National Economy of the USSR and in foreign exhibitions.

The enterprise pays considerable attention to improving the quality of goods. The plant was one of the first in the Ministry of the Machine Tool Industry to have a machine certified with the State Emblem of Quality (model 5851), and now 21 models carry the coveted pentagon. This year the volume of production with the State Emblem of Quality amounts to 44%. This achievement has been brought about by the introduction of a large-scale production quality control system at the plant.

An important part in raising the technical level of production and the efficiency of manufacturing is played by the plant's innovators, inventors and rationalizers, who are unified in primary organizations of scientific and technical societies and the All-Union Society of Inventors and Rationalizers. The activity of these organizations is developing in the direction of working out new engineering solutions, actively aiding in the manufacture of experimental machine tools and components, supervising the implementation of research projects and competitions for better creative proposals, improving the efficiency of socialist competition of plant workers for attainment of highest labor performance, improvement

of production quality and economic expenditure of labor resources based on efficient use of production reserves.

Some of the work done by the members of these organizations is of great technical and economic effectiveness. For example the creative brigade headed by V. Yu. Polyakov has perfected the process of thread cutting on lathes with numerical preset control, which has saved about 10,000 rubles a year. The creative brigade of the OCK [expansion not given] headed by V. N. Potapov has developed a vacuum attachment for clamping parts on the model MSh-259 machine tool that has cut the labor intensity of this operation by a factor of 1.5. The initiative group of this same department, led by L. P. Karabchiyevskiy, has increased the productivity of the machining process by developing a gear grinder that operates by the method of gashing (a plate-shaped wheel); the use of this machine saves about 29,000 rubles per year.

In the line of introducing steps to mechanize production processes, the chief machinist's department has developed a number of machine tools that reduce labor inputs. For example they have made an automatic tool for machining aluminum pipes, a unit-head tool for machining a drill body, a machine tool for grinding involute cams, a horizontal boring machine with a moving column for machining large pieces with precision holes and interaxial distances.

This same service has made mechanized stands for storing tools in the tool crib. Not only has this improved tool storage conditions, but also the accounting records. The labor of workers has been alleviated, the area taken up by the tool crib has been reduced, and the time for finding and dispensing the necessary tool has been shortened. Technical documentation for all these innovations has been worked out by the office of improvements and mechanization, where designers Ye. M. Semenov, Yu. Z. Ulanov and T. M. Lotsmanova and others have been fruitfully working for a long time. Their labor has made a great contribution to the achievement of high performance by the plant collective.

Appreciable advances have also been made by: the creative brigade of V. S. Devyatkin, which has extended the service life of cutting tools by magnetic treatment, saving the enterprise 8,000 rubles a year; the initiative group of V. K. Yermolayev, which has mastered the process of deep-grinding splined shafts, resulting in increased labor productivity; the initiative group of S. G. Borisov, which has introduced the BV-2013 device for adjusting cutting tools in machines with preset numerical control, reducing labor intensity by 80%.

Research laboratories play a large part in technical improvement of production. Both independently and in cooperation with research institutes, they have developed and introduced a system of adaptive control of gear grinders, a number of promising gear machining methods and shaft splining techniques, and new cutting tools, including those made of el'bor borazon, as well as original methods of measuring parts and much more.

The plant innovators pay a great deal of attention to improving efficiency and perfecting existing equipment. For instance they introduced a mechanism for accelerating spindle displacement on the model 656P vertical milling machine, automated the cycle of loading bar stock on the model MF-332 abrasive parting machine tools, converted a Pfauter gear miller to a semiautomatic machine for milling the slots in indexing plates. The technical capabilities of the model 360M machine for grinding broaches have been extended along with those of other Soviet and non-Soviet machine tools.

There are more than 320 inventors and rationalizers at the plant. Last year they made 650 proposals, of which 417 were implemented for a savings of more than a million rubles. These proposals reduced labor inputs by 25,000 norm-hours, saved 20 metric tons of ferrous and nonferrous metals. During the year, four inventions were introduced and 12 claims were made for patents.

One of the plant innovators -- gear cutter G. I. Detushev -- was granted the high title of Rationalizer of the Year for 1978. By using gear hobs instead of the more expensive shavers in machining worm driven index plates on the model 543 master machine tool, he reduced the labor intensity for making items and extended the work life of the tool. The annual savings was more than 10,000 rubles. We could cite many such examples.

To eliminate failure of microswitches in the unit for controlling turret indexing on the model DF-315 lathe with numerical preset control (made in East Germany), which had frequently occurred because of the cutting fluid getting into them, rationalizer A. V. Poluektov designed a unit to eliminate this deficiency, while simultaneously making it easier to adjust the switches. The result was an increase in the reliability of the control unit and a reduction of idle time for the machine.

Just as effective is the innovation by rationalizer V. A. Luk'yanov who made a device for checking precision indexing plates with a tolerance of 0.2-0.4 μm with respect to adjacent peripheral steps, and 0.6-0.8 μm with respect to accumulated error. The device is designed around modern Soviet measurement instrumentation. Introduction has saved more than 8,000 rubles per year.

Rationalizers have been assisted to a great extent in introducing their proposals by departmental authorized agents of the Office for Promotion of Industrial Efficiency and Inventions (A. N. Chernikov, B. I. Kalugin, M. Z. Yekel'chik, I. D. Samko and others), as well as by subdivision directors (A. N. Sergeyev and others).

Thus the entire course of development of the collective of the Moscow Grinder Plant shows that its principal inherent feature is creativity, the ability to independently develop new machine tools and master their

production. And this is no accident. The collective began its development when the scientific basis of machine tool building was just being born, and since new and complicated machine tools were already in demand, they had to develop them alone. Cumulative experience, the enthusiasm of those who had thrown off the chains of exploitation and won their freedom helped in handling this problem. But the continued development and expansion of creativity in the collective were fostered by the environment in which they progressed — the conditions brought about by the Soviet Constitution which supported the flowering of national creativity.

The continued improvement of goods produced by the plant and also of its technical base in combination with widespread socialist competition helps the collective in its struggle for high production performance. As compared with 1977, the volume of salable goods increased by 9.1% in 1978, and labor productivity increased by 10.4%.

Socialist competition is constantly at the center of attention of the administration, the Party and trade organizations of the enterprise, and therefore such competition is distinguished by high effectiveness. We have already said that in the first Five-Year Plans the plant was the initiator of high-speed grinding. This initiative was the basis of rivalry at that time, and has become traditional here. The battle for high machining speeds has continued over the years, and still goes on, taking various forms, of course, the main one being competition to increase labor productivity at each worksite. The names of 250 workers at the plant are to be found on boards of honor for achievements in this competition, and also on the Plant Honor Roll. Among them are shock workers of communist labor drill press operator N. S. Nikiforov and lathe operator Yu. G. Yeroshin who have been decorated with the Order of Glorious Labor, third degree, and others.

Upon the initiative of the scientific-technical department, competition is in progress at the plant under the slogans: "A Technical Base for the Five-Year Plan of Quality" and "An Engineering Thousand into the Money-Box of the Plant." The engineering-technical workers have personal and collective creative plans and obligations that will improve all work indices of the plant.

To improve the efficiency of labor competition, bulletin boards of socialist competition have been installed in all shops, showing the course of satisfaction of socialist obligations by months. In the departments are lists of participants in the competition, many of whom are working on their own personal creative plans. For the purpose of more efficacious realization of set assignments and assumed socialist obligations, improvement of labor productivity and production quality, the departments have introduced brigade forms of work organization in a unified schedule.

The plant has creative ties with a number of enterprises and scientific research institutions of the nation, and is engaged in cooperative

developments with them. In addition, considerable international work is being done in support of the friendly ties with the Chapel' Combine, including regular exchange of worker delegations to keep in touch with production experience.

The fruitful activity of the collective has been marked by a number of awards, including the Leninist Jubilee Diploma of the Central Committee of the CPSU, the Presidium of the Supreme Soviet of the USSR, the USSR Council of Ministers and the AUCCTU for achievement of high marks in honor of Lenin's hundredth birthday, the Diploma of the USSR Council of Ministers and the AUCCTU for achievements in the All-Union Public Review on improvement of production culture (also to honor Lenin's hundredth birthday); the Diploma of the Ministry of the Machine Tool Industry and the Central Committee of the Trade Union of Workers in Machine Building and Instrument Making for high results in a review of production reserves and conditions of economy; the Diploma of the Kirov Regional Committee of the CPSU in Moscow, the raykom of the LYCLSU and the rayispolkom on results of competition. The plant has won challenge Red Banners eight times for quarterly work results. Forty-five workers at the plant have won orders and medals of the USSR, and 100 have been victors in competition.

The high working efficiency of the collective is promoted by the fact that it is based on experienced workers. Two-hundred four workers have been employed here for 25 years or more. There are several worker dynasties at the plant. One of these is the Lotsmanov family with 11 workers having combined service of more than 195 years. Experienced workers not only give their own good labor, but help younger workers to master their craft.

The year 1979 was a special one for the plant. They celebrated the one-hundredth year from the day their enterprise was founded. In marking the glorious anniversary, the collective took on high socialist obligations, resolving to meet the quota of the Five-Year Plan on volume of salable goods by 24 December, and to achieve 0.5% overfulfillment on the quota for productivity. The achievements that have been made by the collective in past years, the patriotism of the workers of this glorious enterprise, the sincere desire to celebrate the anniversary with new achievements are a strong guarantee that all the obligations undertaken will be not only successfully met, but exceeded.

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Weights, Measures

Moscow MASHINOSTROITEL' in Russian No 12, Dec 79 pp 7-8

[Article by Chief Designer A. P. Kurochkin, candidate of technical sciences, Office of Interchangeability in the Metalworking Industry: "Chief Attention Toward Metrological Provisioning for Enterprises"]

[Text] The Office of Interchangeability in the Metalworking Industry is the chief organization on metrology in the Ministry of the Machine Tool Industry. The research and development work done here in the field

of design, metrology, interchangeability and standardization is aimed at development of new principles and methods of measuring linear and angular quantities in machine building, creating highly productive and precise measuring instrumentation on the basis of these techniques, and developing a Unified System of Tolerances and Clearances that is obligatory for all CEMA member nations. Work is also in progress in other areas of international and national standardization.

Considerable attention is given to the metrological support of enterprises of the machine and cutting tool industry. With regard to long-range forecasting, the outlook and trends of development of measurement technology for shorter time intervals, measurement facilities are being developed for a five-year period, and plants are being specialized to produce these facilities; plans are also being developed for progress of science and technology over a two-year period.

The current stage of the scientific and technical revolution is intimately connected with accelerated development of measurement technology in general, and in particular the instrumentation intended for checking linear and angular dimensions, which constitute 80-90% of all measurements made in machine building. Measurement instrumentation plays a major part in resolution of one of the major problems of the Tenth Five-Year Plan: improvement of the quality of all kinds of goods being produced. The information that such instrumentation gives on the magnitude and direction of a change in dimensions enables maintenance of a technological process under optimum conditions that ensure a predetermined level of quality of finished items. Improvement of technology and an increase in production volume have led to an increase in the demand for measurement facilities and to more severe constraints on productivity, accuracy and reliability.

Over the last decade there has been an acceleration in the transition from so-called passive monitoring aimed mainly at quality control of finished production, i. e. the recognition of rejected goods, to active monitoring in which measurement instrumentation is a most important part of the system for controlling the precision of the technological process. The use of active monitoring facilities on ordinary machine tools, machine tools with preset numerical control and automatic transfer machines solves a number of important technical and economic problems: increasing the labor productivity of machine operators and the quality of finished goods; automating the machining process; reducing the volume of sequential monitoring operations; utilizing the labor of less skilled machine operators. Therefore enterprises as a rule strive to have special measurement facilities adapted to a specific machine tool, technological process or object of measurement.

This trend on the part of the user comes in conflict with the manufacturers' desire to make such facilities. This conflict can be eliminated by developing and mastering the production of standardized sets of

measurement facilities designed on the modular principle, providing for the possibility of grouping. A high level of standardization considerably increases the size of series production of items, and stabilizes the product mix.

Analysis of various physical principles of measurements has shown that current and future requirements will be most completely met by the electronic principle that enables development of measurement instrumentation with high dynamic and accuracy characteristics and reliability indices. They will have high universality and flexibility, interface readily with computers and secondary devices, and will be adaptable to series production by specialized enterprises. The outlook for this kind of measurement principle is that its element base is rooted in electronic technology, where rapid development has been the basis for continual expansion of metrological capabilities in the area of application of measurement instrumentation, enabling organization of highly effective production based on the use of standard off-the-shelf elements, modules and subassemblies.

Considering this, the collective of the Office of Interchangeability has concentrated its efforts over the last five years mainly on the development of electronic measurement facilities. Development is currently being completed on a new generation of a standardized measurement instrumentation complex for dynamic active monitoring. Industrial production is being mastered in parallel by specialized enterprises. The devices are designed for measuring comparatively small displacements (1-3 mm), and are based on the inductive working principle. They are made in a unified circuit with the use of a unified element base. In addition to the self-contained design, the devices are also made in a panel modification for installation in panels, cabinets and bays.

The complex includes a limited number of base models, functional modules and primary converters, and also a wide range of modifications made by combining base models and attachments based on standardized modules (stabilizer, amplifier, null indicator and so on). There are about twenty of them in the complex.

The measurement instrumentation also consists of standardized elements, in particular primary converters. However, their arrangement, the construction of levers and switches, methods of tie-in and other specifics are determined by the part to be measured (its configuration and dimensions) and the equipment on which the monitoring facility is installed.

The series of facilities for dynamic monitoring in the self-contained modification includes one base model and eight modifications of modules differentiated as to the form of readout device, the number of converters, the scale division and the measurement range. The coefficient of standardization is at least 0.9-0.95. The series includes five attachments: sorting, amplitude and zero-adjust with coefficient of standardization

of 0.6-0.85. By connecting off-the-shelf chart recorders to the devices, self-recording instruments are created with first, second and third class precision, and a coefficient of standardization of at least 0.85.

A range of active monitoring facilities has been developed for practically all machine tools on which workpieces are finished. Further improvement of the active monitoring systems is aimed at expanding their functions in the aspect of optimizing the technological process and control of machine tools (primarily grinders) with respect to several parameters of regulation with adaptation to the actual speed of removal of the machining allowance and other destabilizing factors, with elements of the cycle programming. Efficient organization of each machining cycle as a function of the variable factors optimizes the final stage of the machining cycle by stabilizing the speed of removal of machining allowance and temperature deformations during the period preceding the transmission of commands to stop machining.

Of considerable significance are measurement systems designed for short-series and medium-series production, where the output volume reaches 70% of the total machine building output. The creation of active monitoring systems for short-series production is taking the path of utilization of wide-band converters, by which the converters of small displacements are set to a certain dimension. The measurand is determined by the resultant signal of the wide-band converter and the small-displacement converters.

To ensure wide measurement ranges (active monitoring systems for machine tools with numerical preset control, instruments for measuring kinematic accuracy and a number of other parameters of gears and gear trains), the photoelectric working principle is used. Electronic devices enable replacement of complicated mechanical kinematic chains that provide standard displacements and trajectories with accuracy capabilities that are practically used up, therefore they are incapable in many cases of meeting the requirements of modern instruments.

Considerable attention is being given to measurement instrumentation for precision dimensions, in particular the diameters of holes, elements of tapered couplings and heights. These instruments are also based on the electronic principle of action. At the same time, measurement instrumentation using conventional working principles (mechanical, electro-contact, pneumatic) occupy a limited place in our developments.

To raise the efficiency and quality of work, and the technical level of measurement facilities, to accelerate developments and mastery in production, a number of organizational and engineering steps are being taken: extensive standardization of designs in the framework of the subsector, development of limiting normative-technical documents, specialization of structural subdivisions in accord with the major technical areas of activity of the organization, specialization of leading designers in development of certain types of instrumentation, etc.

The Office of Interchangeability is giving serious attention to problems of the technical policy and organization of the production process. In joint sessions of the scientific and technical council and the Party office, consideration is given to thematic plans, problems involving work on a new system of planning, financing and economic incentives, the results of activity of the organization for a given period. Experience shows that with such joint consideration of problems, effective recommendations can be worked out for improving the work of the organization.

Scientist competition between related subdivisions is extensively developed in the organization, contests are held for the best developments. The Scientific-Technical Society and Council of Young Specialists take an active part in organizing these contests. Among the winners of a contest in 1975 were leading specialists M. P. Sobolev, Yu. D. Vinogradov, A. V. Strokov, V. B. Kogan, B. D. Afonakiy and B. D. Konstantinov. Winners of the contest for best work by young specialists were V. V. Monkalev and I. B. Karpovich.

The collective of the Office of Interchangeability is making efforts to meet the quotas of the Tenth Five-Year Plan ahead of schedule, and to create a modern base for metrological support of Soviet machine building.

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Direction Finders

Moscow MASHINOSTROITEL' in Russian No 2, Feb 80 pp 17-18

[Article by E. A. Zaslavskiy and R. Z. Khaykin: "New Direction Finders"]

[Text] Devices for dividing and measuring angles have been developed by the OKB SA [Onoboye konstruktorskoye byuro sredstv avtomatiki: Special Design Office for Automation Facilities] on the basis of a geared circular inductive transducer (CIT) developed by S. S. Podlanov and G. M. Brodskiy (USSR Author's Certificate No 116538). The CIT divides a circle precisely into a predetermined number of equal intervals. The angle within the range of an interval is read out by a precision device called a mechanism of intrastep division or (in a special case) a mechanism of intradegree division. Thus a circular measurement system with the CIT is a two-reading system.

Utilization of the high metrological properties of the CIT and other improvements have led to the development of precision indexing heads model EDG-3 and rotating tables model EDS-1 (inventor V. A. Gabinov). On the basis of the CIT, the Kaunas Machine Tool Plant imeni F. E. Dzerzhinskiy has developed a series of rotating tables for jig borers, and has begun series production of these tables.

The authors of this article have gone on with the cooperation of E. L. Abramzon in developmental work using the CIT with an aim to automation

and expansion of the field of application. In this article we examine the major models of angle-measuring instruments that have been developed.

The model IP5200A1 inductive rotating table with preset numerical control (Author's Certificate No. 172544) is designed for precision rotation of workpieces through arbitrary angles in accordance with a preset program. The table meets accuracy class C. Chuck diameter is 280 mm.

The feedback sensor of the table is a CIT that is high in accuracy and sensitivity, yet is simple in design and can be reliably protected from interference.

The table is controlled by a standard open programmed control system based on step-by-step motors. The combination of the CIT with a step motor is the distinguishing feature of this design, and it is accomplished as follows.

First the CIT provides coarse adjustment, turning the table through a given number of steps, making an angle a little less than the nominal value. Then the feedback sensor is engaged, and the step motor in the slave mode precisely turns the table faceplate until a zero signal is received from the CIT. This peculiarity of the drive system ensures high accuracy and productivity of control. The angle coordinates are set on punched tape with discreteness of 0.25°. The maximum error of setting the chuck on a given angle in the automatic mode does not exceed 6" with repeatability of the setting within ±1".

The table is used on a finishing machine tool with numerical preset control for machining polyhedra, and on an electrocorrosion machine tool with numerical preset control for making pieces of complicated configuration in polar coordinates. The angular error of polyhedra machined on this table does not exceed 6-8" between any two faces and the surface finish is class 12.

There are semiautomatic modifications of the table, and also a special modification for electrocorrosion machine tools with numerical preset control.

The model RK5T1 precision indexing head with digital display is intended for precision dividing jobs and various kinds of checking operations such as measuring the cumulative error of division of precision dials, index plates, gears, splined shafts, measurement of cyclic and cumulative errors in the pitch of lead screws, worms, worm hobs, checking the profiles of precision cams and so on. The maximum measurement error over a 360° range is 3". This dividing head can be used in machining a variety of items on surface grinders, jig borers, coordinate grinders and precision milling machines. The permissible load on the spindle (including the force of the cutter) is 100 kgf. Stiffness in the radial direction is 15-20 kgf/μm.

The head can be installed on the pedestal or table of a machine tool in two positions: with horizontal or vertical spindle. The height of centers of the indexing head (without spacers) is 150 mm, and the diameter of the faceplate is 250 mm. The head consists of a cast housing that acts as a base for assembly of all components, and a remote display unit with zero indicator (readout) as well as digital display channels. The CIT and other mechanisms are installed in the housing of the head. On the front of the housing is the faceplate clamping mechanism. With engagement of this clamp, the permissible torque on the spindle may reach 5 kgf·m.

The setting of fractions of a degree and spindle rotation are accomplished by the use of two separate kinematic chains to which the brushes of five transducers are connected in the digital display. To get a given angle of rotation of the handwheels, the degrees, minutes and seconds are set in accordance with the digital display panel, which consists of seven digital places with a value of 1" in the least significant place. Then a fine-adjustment knob is turned to zero in the faceplate in accordance with a dial indicator on the indexing head. When measuring deviations of the actual angle from the nominal value on this dial indicator, the deviations are read out within a range of $\pm 25''$. In case of necessity for determining large deviations, the actual angle must be measured, and then the nominal value is subtracted.

The use of digital readout considerably reduces operator fatigue, and also the probability of error, and appreciably increases labor productivity.

During 1976-1978, the OKB SA made 22 EDG5Ts1 heads for 13 enterprises.

For the purpose of carrying out the above-mentioned control operations, the indexing head is supplied with four sets of attachments.

Set No 1 is used for operation between centers with a horizontal axis. It consists of a tailstock, attachments, a set of spacers for changing the height of the centers (200, 250 mm), a device for checking coaxiality of the centers, backrests and an instrument for checking the circular pitch of gears. Set No 2 consists of a cast pedestal and a base. Set No 3 is used for measuring jobs with a vertical axis, and consists of a vertical stand with a live center and a workpiece table. Set No 4, a program-block device, is intended for automatic comparison of given angular dimensions preset on program modules with the angular dimensions set on the indexing head. Use of the program-block device prevents erroneous setting of the angle by the operator, and is recommended for machining costly and important workpieces.

In practice it is frequently necessary to do a number of repetitive indexing operations with large job volumes. For this purpose, the hand-operated model was used as the basis for design and manufacture of the model EDAP universal electroinductive indexing head equipped with a digital angular coordinate display and automated preset spindle drive.

The automated drive minimizes the number of manipulations required when working on the indexing head. The operator's job is mainly to set the nominal angle on the selectors and record the measurement results. Labor productivity on the EDG4P head is 3-3.5 times as high as for manual units.

A circular measuring machine has been developed for measuring the angular error of precision angle-data units such as the SKVT, code-to-angle, inductosyn and others. This machine is based on a device for dividing and checking angles (Author's Certificate No 324482) with two CITs that form a readout system with discreteness of 1", eliminating the mechanism of intrastep division. The machine includes a control panel, modules, a chart recorder and digital printer. The working program of the unit is set by selectors on the control panel giving the required angular pitch and the number of steps (cycles). The value of a step lies in a range of 1-360° with discreteness of 1", and the number of steps is up to 10,000. If the angular step that is set contains fractions of a second, the fractional part (up to four decimal places) is also assigned in setting up the program. A module built into the machine automatically adds this correction on each angular step, and as whole seconds are accumulated they are worked off.

The machine is equipped with a system for digital display of the angular coordinate and automatic recording of measurement results (graph, chart). Two basic modes of automatic operation are provided: stopping the spindle on a zero signal with readout of the error on a signal from the workpiece, and stopping the spindle on a signal from the workpiece with readout of the error in angular measure. The maximum angular error of the machine does not exceed 2". The design includes a special mechanism for correcting this error.

To check the accuracy of the machine and correct the error during manufacture and operation, a special automatic mode of certification of the CIT is provided with registration of the results on the digital printer. With appropriate modifications, the machine can be used as an automatic measuring device for checking other precision items, in particular for measuring spur gears up to 600 mm in diameter with class 3-5 accuracy. On the basis of the model 3172 machine, the OKB SA has developed a model 3384 device for measuring high-precision indexing plates. The error of measurement of the cumulative error in plates up to 400 mm in diameter is no more than 1 μm.

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Chepel' Plant

Moscow MASHINOSTROITEL' in Russian No 2, Feb 80 pp 43-45

[Article by M. D. Shteyngart: "The Krasnyy Chepel' Plant Today"]

[Text] Last October at the Exhibition of Achievements of the National Economy of the USSR, the Chepel' Metallurgical and Machine Building

Combine displayed its products. The display was a review of achievements of the 'Zhasnyy Chepel' collective, attained in the course of competition for maximum labor performance. The advances made by the combine were made possible in large measure by considerable material and technical assistance to our friends in Hungary on the part of the socialist brotherhood of nations, and especially the Soviet Union. It is for this reason that the combine celebrated a real holiday on 31 May 1979 when L. I. Brezhnev, General Secretary of the Central Committee of the CPSU, Chairman of the Presidium of the Supreme Soviet of the USSR and a sincere friend of the Hungarian people, presented the collective with the Order of the October Revolution in the Budapest parliament.

At the exhibition, the Chepelians showed articles of all their enterprises: steel plant, pipe rolling mill, iron and steel foundries, machine building and machine tool plants, transformer plant and so on. Among these items were facilities and mechanisms for iron and steel casting, drawing and welding pipes, making steel gas cylinders, various kinds of machine tools, hoisting cranes, bridge structures, machines for the sewing industry and so on.

The machine tool plant displayed radial drilling machines, milling and drilling machines, programmable lathes, gear and thread grinders. The lathes made at the plant are highly automated, can be used for machining disks, tubes and sleeves, and are very economic. They are designed to take universal fittings with rapid tool changing, high productivity and high precision. Profiling machines can be used for making items with tapered and curved surfaces by linear and circular interpolation.

Machine tools are set up for operation rapidly and accurately by using a numerical preset control system and attachments for preliminary tool alignment. Roughing and finishing operations are done on the same facility. In the machines, the program is set by a system of stops that is set up beforehand away from the machine tool itself. They can handle rectilinear displacements parallel to the axes and also at an angle of 45°. By introducing information on changeovers into the system, the program can include spindle speeds, amount of spindle rotation, feed, rapid travel, setting of stops, feed of cutting fluid. The information is stored in a ball-bearing step switch. The machines have a flat table with locating and clamping components, where the prealigned cutting tools are accommodated. The toolholder designs enable the use of programs that provide for simultaneous cutting by several tools. An electronic device is used for screw cutting operations. Feeds are programmed with continuous variation. Various preset numerical control systems can be connected to the machines.

The ERI-150 machine is equipped with a single ten-position turret, and the ERI-400 has a four-position and a six-position turret for machining external and internal surfaces respectively. Both turrets are installed on rigid carriages. The ETL-250 machine has "sliding" feed for precise

positioning. The carriages are driven by pretensioned ball and screw units.

Technical specifications

	ERI-250	ERI-400	ETL-250
Maximum swing over the ways, mm	500	630	500
Carriage travel, mm:			
longitudinal	400	450	400
transverse	225	640	600
Range of spindle speeds, rpm	63-1400	14-1800	63-1400
Range of feeds, mm/min	0.22-1780	0.22-1780	0.06-0.55 mm/rev

The gear and thread grinders produced by the plant are of considerable interest. The PK 326-10 semiautomatic precision gear grinder operates on the principle of surface generation. The machine is designed for production and precision grinding of simple and corrected spur and bevel gears 10-320 mm in diameter. It can be used for grinding gears without premachining of the teeth over a modulus range of 0.6-1.5, flanking the tops of gear teeth, producing a transitional curve to avoid interference of edges, and machining barrel-shaped teeth. The grinding cycle is completely automated. The operator has only to set up the workpiece, put the wheel into contact with it, start the machine and remove the finished work. The depth of rough and finish grinding is preset.

The carriage system of the machine has hydraulic and mechanical drive from electrohydraulic slide valves. The processes of grinding and wheel dressing are kept separate by interlocking systems. The machine is equipped with attachments for truing the wheel, its profile and periphery, and with special fittings that extend its technical capabilities.

Technical specifications

Range of the number of teeth	12-260
Maximum angle of slope of teeth	$\pm 45^\circ$
Depth of cut, mm	0.01-0.05
Wheel diameter, mm	330-450
Wheel width, mm	63, 84 and 140
Speed, rpm:	
in grinding	1500
in dressing	60

The KM 250/500 and 250/1000 thread grinders produced by the plant are designed for machining threads (metric and inch gages, single and double threads, straight and tapered), taps, gear hobs, rollers, ball and screw couplers, and nuts. The distances between centers are 508 and 1060 mm respectively, and machinable thread length is 485 and 1020 mm. Except for the beds and carriages, the component parts of the tools are alike.

The machines are equipped with special attachments that enable machining of internal threads, gear hobs of small diameters and large thread pitch angles. Manual and automatic devices are also provided for wheel truing. The speed of the grinder spindle is set to fit the kind of machining. Short threads can be ground by incision. The wheel is held on a tapered spindle surface, and the required thread pitch angle of 145° is set by the rotating part of the headstock.

The drive mechanism of the table is fastened to the bed. Wheel withdrawal after each pass is accomplished either manually or automatically by stops. Various clamping devices can be installed on the forward end of the spindle. To improve machining accuracy, a correcting device is provided that compensates for errors associated with the difference between the temperatures of the lead screw and the workpiece.

Technical specifications

Maximum grinding diameter, mm	254
Maximum diameter of thread, mm	19
Height of centers, mm	127
Maximum thread taper	1:8
Maximum diameter of chucked workpiece, mm	38
Number of headstock spindle speeds	20
Headstock spindle speed range, rpm	0.32-95
Maximum wheel diameter, mm	405 x 76 x 203
Grinding spindle speed, rpm	180-850-1540

The machine tool plant has developed a new series of drilling and milling machines. Modular design gives the optimum choice of modification for handling specific jobs, and the materials used in the tools provide capabilities for severe cutting conditions in a large work space. The machines are made with horizontal and vertical spindles, and also with a six-position turret that turns in the horizontal plane. In case of necessity they can be equipped with a tool magazine and a tool-changing attachment. The spindle stock is equipped with rigid precision bearings. In the base model, the machine has a spindle with ISO 50 tool cone, but it can be made with an ISO 40 or ISO 45 cone. The tools are clamped by a hydraulic system, and in turret machines clamping is automatic, while a pedal is used in non-turret machines. Machines with horizontal spindle can be made with different types and sizes of rotating tables. They are also provided with a device for changing the workpiece off the machine while it is in operation, which increases productivity and reduces setup time. The moving parts of the machine, ball and screw couples and spindle are driven by regulated DC motors, providing a wide range of continuously variable speeds and feeds.

Depending on machining complexity, the numerical preset control systems of the machines provide contour control with simultaneous interpolation

on two or three axes. On machines with vertical spindle, the numerical preset control system can be replaced by the Gettis copy-milling unit that handles two-coordinate profiling. The machines are made with special attachments such as a manual control panel, reducing cones and so on.

Technical specifications

Table dimensions, mm	630 x 1200 x 1600
Longitudinal travel of table, mm	1200-1600
Transverse travel of headstock, mm	600
Vertical travel of spindle carriage, mm	700-1000
Range of feeds, mm/min	1-1200
Spindle speed, rpm	22.5-1800

For making tools, items and punches from tempered steel and hard alloys, the plant produces machines of the Erozimat type for electrospark machining. The bed of the machine is welded from 6 mm sheet iron. The pedestal contains an electrohydraulic feed regulator, bins for attachments and a tool plate. Attached to the pedestal is a cast iron column over which the machine head is moved in ball guides by a hydraulic cylinder. A micrometer in the column automatically disengages the feed when the preset machining depth is reached. The coordinate table of the machine moves on a threaded rod. An indicator is used for precise setting. A working table and a tank are situated in the upper part. The working parts of the table that are under voltage are protected by a Plexiglas guard. The temperature of the working fluid in the tank is monitored by a heat sensor that switches off the machine when a predetermined temperature is reached.

The D-T2/V fluid supply unit is welded. On the top of the unit is a pump with hoses that go to the 260-liter tank. On the side of the unit are three filters with replaceable cores with total filtering surface of 10 sq. m. The supply unit continuously feeds fluid (kerosene) into the tank through a filter or directly. Another type D-T1/A hydraulic unit used on the machine is comprised of an oil tank, a geared oil pump, a manometer, and fine-cleaning filters in the pressure and suction lines. The unit works on a pump. The filters are in the upper part. Power supply to the machine is from a type SGR-400/A relaxation oscillator.

Technical specifications

Working surface of the table, mm:	
stationary	400 x 700
coordinate	280 x 400
Respective maximum heights of workpieces, mm	240 and 150
Range of travel of the coordinate table, mm	160 x 220
Regulated travel of the head, mm	300

The exhibit provided a graphic demonstration of the high technical level and high efficiency of equipment made by the Chepel' Metallurgical Combine. At the same time, it clearly showed the great technical progress that has been achieved in the glorious brotherhood of the socialist family of nations.

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Troubleshooters Described

Moscow MASHINOSTROITEL' in Russian No 4, Apr 80 pp 14-15

[Article by I. G. Delimov: "Organization of Labor for Setup Workers for Numerically Controlled Milling Machines"]

[Text] Materials of inspection and analysis of the work done by setup men for tape-controlled milling machines shows that inadequate regard is given to organizing their work in most enterprises. As a rule, there are no working stations for setup men, or they are equipped without observation of the requirements of scientific organization of labor. In addition to their main and auxiliary functions, these workers are often doing jobs out of their jurisdiction, resulting in intrashift losses as high as 18-20% of the working time in some shops. A great deal of time is also lost because of poor supply of working stations with the necessary parts, workpieces and tools. To eliminate these inadequacies, a plan has been worked out that reflects the problems of organization of the working station, the technology of carrying out setup jobs, division and cooperation of labor, payment and calculation of the work force.

The setup job includes equipment inspection, preparation of tools and jigs for setup, preparation of the program media for work (magnetic or punched tape), setup, adjustment, resetting and checking the equipment, and giving instructions to the machine operator. Setup of newly installed, updated equipment, or equipment that has stood idle for a long time includes work on preparation, installation, regulation and checking. For this purpose, a trial run is made to check and regulate not only the individual mechanisms, but their operation in concert. After this, the observed problems are eliminated. Resetting the equipment includes installation of fixtures, regulating and checking the operation of the equipment, involving changeover to manufacture of a new product similar in technological properties (mechanical, structural and so on) to the product previously produced. Adjustment of the equipment involves elimination of maladjustments that have arisen in operation due to tool wear or breakage, worn jigs and fixtures, nonsynchronous operation of the individual units and mechanisms. The amount of idle time of production workers and the quality of the setup are determined by the way that the work is distributed between setup, resetting and adjustment of equipment.

The proposed plan outlines the major duties of setup men for tape-controlled machine tools, and the procedure for assignment and termination of work.

The working station of the setup man is considered as part of the area of tape-controlled machine tools where he carries out a specific production assignment. Factors taken into consideration in the conception, development and design of the working station included specialization, level of mechanization, work technology, techniques, methods and working conditions.

A distinction is made between the general (or external) and internal design of the working station. The general design covers placement of the tools, equipment and worker within the limits of the working station. The station is equipped with a workbench, a floormat, a setup locker, a testing and checking stand, an equipment shelf, a rolling table, an adjustable chair and a wastebasket.

A special unit is provided for storing and carrying the program tapes: a magnetic tape storage cabinet in the tool crib, special cartons for transporting tapes, an open shelf for storing tapes in the production room, and cassettes for magnetic tape storage.

The measuring tools (trammel points, micrometer, millman's tape and so on) and hand tools (wrenches, nut drivers, nibblers, needle files, mallet and so on) are stored in the setup locker. During work, all measurement and hand tools, program tapes, samples of workpieces to be machined on the miller are placed in a special container on the rolling table.

The internal design of the working station covers the placement of tools, fixtures and necessary materials on or inside of the work organizers. A typical work arranger contains a number of shelves and drawers for accommodating samples of workpieces, cutting tools, jigs and fixtures, personal items, cleanup items, measuring tools, auxiliary tools and blueprints.

Based on analysis of the existing balance of time for setup men, a balance has been worked out that provides for a rational sequence of job performance during the shift, which will reduce the time lost by the setup men, machine operators waiting for setup, and idle time of machines.

On the basis of a study of enterprises in the sector, a typical labor process has been worked out on the example of a single operation performed in machining the base of a wing spar on the 6M13GN-1 milling machine. The process contains a detailed description of the movements of the setup man in installing the tools, the base fixture and the part to be machined, the magnetic tape in the tape-transport mechanism,

checking and adjusting the trajectory of motion of the tool over the trial workpiece, i. e. the operations that are most frequently encountered in doing setup jobs. Recommendations were worked out on choosing a rational system for servicing the working stations of machine operators, a brief outline is given of the system of schedule planning and accounting, and the forms of documentation that are used for these jobs. In accordance with the system of planned preventive maintenance of working stations, the setup man carries out: a preliminary orientational inspection of the shift assignments of the workers under his care; timely verification and provision of attachments, tools and program tapes for doing setup jobs; making certain that they are at the working station at the proper time. The system of planned preventive maintenance of working stations also provides for: daily shift planning by equipment groups assigned to the setup man; the use of modular construction of program control panels, which reduces repair time through rapid replacement of damaged modules; centralization of repair jobs on the scale of the enterprise, and setting up comprehensive teams for servicing equipment; the use of wide-coverage technology that determines the content, sequence of performance and labor intensity of setup jobs; setting up relay teams of setup men on different shifts; keeping continuous track of the state of equipment and reasons for failures; providing the control panels with facilities for automating the process of tape winding; enforced replacement of cutting tools in accordance with predetermined schedules based on the rated service life of the tools. In addition, the system establishes the dependence of payment to setup men on the production indices of the sections under their care.

Communication between the working station of the setup man and the shop services is by telephone, and signal lights are used to call the machine operators to the working station.

Division and cooperation of labor on the setup function of servicing is between auxiliary and main workers, and also between the auxiliary workers themselves (setup man, machinist repairman, inspector and so on).

Two versions of division and cooperation of labor are recommended between the setup man and machine operator. In the first of these, the setup man is responsible for setup, resetting and adjustment, and the machine operator is responsible for operative work and checking the operation of equipment; in the second version, the setup man does the setup and resetting, and the operator does the adjustment and operative work. If the setup man is not sufficiently loaded by his main work, he should be charged with production quality control, servicing the working stations of machine operators, equipment and so on. In series and large series production, collective (team) forms of work organization are being more and more widely used, in which it is possible to combine the functions of the machinist repairman, electrician and setup man.

Recommendations on payment to setup men provide for the use of time-rate plus bonus, indirect piece-rate, indirect piece-rate plus bonus and team systems of wage payment. The bonus payments differ for each enterprise and reflect the specifics of production, but as a rule, consideration is given to: fulfillment and overfulfillment of quotas on the serviced equipment, lack of above-plan outages and rejected work that is the fault of the setup man. The overall bonus with respect to all indices should not exceed 40-60% of the wage rate for time-rate plus bonus payment, or the average percentage of the machine operator's bonus in indirect piece-rate plus bonus payment.

When the setup men are handling more machines than established in the norms, their pay should be increased by a coefficient calculated as the ratio of the number of actually serviced units to the number provided by the norms. Calculation of the work force of setup men should be based on servicing norms.

Recently in the field of setting norms for labor of setup men there have been a number of experimental ventures using modern mathematical models. At the Scientific Research Institute of the Motor Vehicle Industry, under the direction of Candidate of Economic Sciences A. P. Pavlenko a formula was derived for calculating the servicing quota for setup men as a function of the number of units of repair complexity of a single machine that was to be set up, the average number of cutting tools used in a month per machine-shift, the ratio of the number of units of repair complexity of automatic transfer lines to the number of units of repair complexity of all installed equipment, the average grade category of the setup men in the shop and the degree of utilization of equipment, which is applicable to enterprises of the sector:

$$X_0 = 7.39 - 0.39X_1 + 0.18X_2 - 14.4X_3 + 2.39X_4 - 7X_5.$$

At Moscow Aviation Institute under the direction of Doctor of Economic Sciences, Professor Ye. I. Sherman, based on the use of queuing theory, modeling of labor processes on computers and the theory of search for optimum solutions an algorithm has been developed for calculating the number of effective machine tools as a function of the machine operator work force and the number of setup men.

Introduction of the recommendations of the plan for organizing the work of setup men for tape-controlled milling machines, providing for a reduction in losses of working time by production workers and cutting labor inputs for production of goods, i. e. its cost with respect to direct expenditures, has saved 5,800 rubles on one section with 30 units of equipment.

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Increasing Accuracy

Moscow MASHINOSTROITEL' in Russian No 4, Apr 80 pp 25-26

[Article by V. V. Iyevlev: "Improving Machining Accuracy of Numerically Controlled Lathes"]

[Text] The conventional method of improving machining accuracy by setting up the cutting tool off the machine is not very effective since it only compensates for the error in setting the tool. The comprehensive solution of this problem requires additional compensation for deviation of the workpiece dimensions from the nominal dimensions, resulting from the preceding operation. The amount of this deviation may take any value within the limits determined by the field of the tolerance margin for a given dimension. In this article we consider one of the possible directions that can be taken for effective solution of the problem of precision of linear dimensions obtained on tape-controlled lathes.

All dimensions on these machines are given in a coordinate system. A diagram for assignment of dimensions when programming the process of machining cylinders is shown in Fig. 1. The process is made up of operations of boring the opening and turning the outer surface to the proper linear dimensions.

In the given technological situation the quantities δ , B , Γ , Δ are taken as constant, and their values are taken as equal to the nominal values. The length A of the workpiece can take any value within the range determined by the tolerance of the preceding operation. The tolerance on dimension A exceeds that on dimensions δ and B .



Fig. 1

In machining a batch of workpieces, several different dimensions δ and B are obtained. Their relation to the nominal dimensions at the extreme values of dimension A will be:

$$\begin{aligned} A_{\max} & \dots \delta_n > \delta, B_n > B \\ A_{\min} & \dots \delta_n < \delta, B_n < B \end{aligned}$$

This gives an idea of the considerable instability of the process of getting linear dimensions. This deficiency can be eliminated by automatic adjustment of

the zero point of the program. This adjustment is handled in the following way (Fig. 2). Before machining, measurement device 1 on the lathe checks the length of the workpiece. A measurement signal through control unit 2 and numerical preset control system 3 controls drive 4, which generates the necessary correction for the change in the calculated zero position of the program point. The automatic cycle for setting the

zero point includes: rapid approach of device 1 to the measurement zone, slow approach to the workpiece, measurement, withdrawal, setting the true zero point of the program.

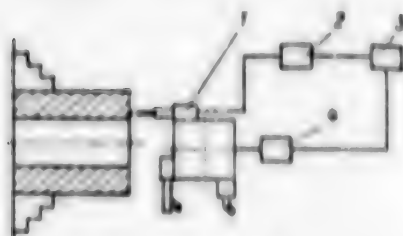


Fig. 2

The main element of the measuring device is a type KDM-13 sensor. The control circuit is based on integrated microcircuits series K 155, and is built into the numerical preset control system.

The proposed method provides complete compensation for the error due to the margin on the preceding operation. At the same time, it compensates for the

error caused by thermal deformation of the spindle. The method of automatic adjustment of the zero point of the program has undergone industrial testing on model 16K30F3 tape-controlled lathes.

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Banks of Machines

Moscow MASHINOSTROITEL' in Russian No 4, Apr 80 pp 29-30

[Article by B. A. Pan'kin, M. A. Smolkin and L. A. Lyubeznikova:
"Production Specialization Using a Group Machining Method"]

[Text] Under conditions of short-series and custom production with a wide assortment of goods produced, use of the group method of machining takes on particular significance as it reduces unjustified interruption of the production process. Collaborators at the Leningrad Institute of Engineering Economics in cooperation with specialists of the Znamya Oktyabrya Production Association have done studies at an enterprise that produces more than 400 different items in a year, 70-75% of the product mix being produced each year in lots ranging from a single item to a batch of twenty. The organization of the group production method in this enterprise was preceded by specialization of production subdivisions and individual working stations for machining a given type of item or for an individual technological operation.

Specialization of departments in the enterprise is based on classification of items, i. e. unification into technological-design groups. The items are unified by common design elements, type of drive, type of combination. Machining of items in production is organized in departments where technologically closed grouped-item sections are formed.

Multiple-product grouped-item lines are organized within the sections. All machining sections feed output to a unified warehouse of finished items and a unified assembly section. To support this specialization in manufacturing items, a unified central section has been set up for

cutting workpieces from rolled stock. This section feeds output to a centralized dispensing warehouse.

Classification is based on the sector-wide and Soviet-wide classifier. The classification indices are the essential technological design characteristics of the items, on the basis of which their technological similarity is determined. Certain positions and significances are assigned in the structure of the technological code of the items for each characteristic.

Corresponding to each type of item is a technological card of applicability with a drawing showing letter designations of principal dimensions, the numbers of blueprints and the principal dimensions of items belonging to the given type along with the technological code of the item. The title of the card provides the designer code, the name of the item, its dimensions that determine the version of the technological process applicable to the given type.

Technological design classification is the basis for organizing specialized-item sections. A YeS-1020 computer is used to produce charts each year in which items are grouped by classes, groups and types with indication of applicability in items, and amounts by quarters and groups. The chart can be used to distinguish the principal groups of items in each class with calculation of amount and labor intensity. From these groups, an analysis is made of the existing technology, and accordingly major areas are developed for improvement with consideration of introducing progressive equipment, and primarily tape-controlled machine tools.

Machining of all items is assigned to the specialized-item sections depending on common design elements and the fundamental technology of machining the items: solids of revolution to the first and second sections, shell components to the third and fourth sections, items other than solids of revolution to the fifth section, fastenings and shafts to the sixth section. All sections have high-productivity equipment (more than 30 machine tool units with twenty models of preset numerical control) depending on the groups of items to be machined.

Multiple-product group transfer lines for machining items of standard technological design groups on tape-controlled and universal machine tools are set up within the grouped-item sections. The group transfer lines provide a closed cycle for machining parts, rationally planned production with a reduction of transfer time on flow routes from one operation to the next.

For example, a group transfer line for machining pistons consists of several model 1P752F2 machine tools, a model AT320MTsK machine tool, two model 16K20F3 machine tools and one model 1282 semiautomatic machine arranged with consideration of multiple-machine servicing. The flow of the machining process is as follows:

preliminary machining of holes and necks on the 1202 semiautomatic machine;

additional machining (for heat treatment and welded-on surfacing) of internal surfaces on the A130MTok machine, and outer surfaces and necks on the 16K20P3 machine;

finishing of inner surfaces with threading on the 1P752P2 machine;

finishing of outer surfaces and grooves on the 16K20P3 machine.

Cards of type applicability are assembled into a classifier card catalog where they are grouped in order of increasing numbers of types into groups, and the groups are assembled into classes. All components included on a card of applicability in the same group and class are described in the same specialized-item section. The items that have the same major indices in the technological code (dimensional characteristic, type of initial workpiece and material group) are recorded on one type applicability card and machined in a group technological process, i. e. they have a common route of flow of machining, the same equipment, and and also the same machining outlines and technological bases in each operation of the same kind. A single quickly readjustable fixture and a single tool setup is worked out for the entire group of items that are part of a given type.

In each type, the most complicated item is taken as the leading item on which the technological process of machining is an analog for subsequent development of technology of manufacture of all items of the given type. The resultant technological process is sent on for fitting with special equipment. The initial data for design of group fixtures are the group of technological operations of the same kind that go into the same type according to the classifier. For each group of operations on the item, a base fixture is designed with interchangeable parts (Fig. 10a). A group fixture. The number of operations on an item in the group characterizes the degree of applicability of the group fixture.

The classification of items and the organization on this basis of group equipment, group processes and assignment of items to the item-specialized sections improves the conditions for machining the items in batches. Group methods of developing technological processes take on particular significance when machine tools with numerical preset control are introduced. In this case the development of individual machining operations increases the volume of technical preparation of production. An important reserve for reducing the labor intensity of production preparation is orderly arrangement and classification of the developed documentation for utilization, and as far as possible, repeated use. Each operation on an item has a controlling program and a setup card with a list of necessary fittings and similar.

For the purpose of efficient utilization of tape-controlled machine tools, a classifier card catalog of operations on items has been set up on the basis of the card of applicability of operations on items.

The card of applicability of operations on items contains the following data:

the designator code of the dimensional subdivision, kind of operation;

a drawing with dimensions typical of the given operation;

the numbers of the blueprints in the given technological design group, grade of materials, kind of workpiece;

information on the equipment used with numerical program control, numbers of programs compiled, notes on introducing them;

principal characteristics of the technological code and number of the setup sheet.

The card of applicability of operations on items is supplemented by a loading setup chart for operations on items and a loading control program or similar loading computer program. This documentation gives all necessary information on machining geometry and technology for the operation without introduction of the specific shifts in parameters used for compiling the working documentation for the item.

The loading setup chart is assigned a conventional three-number code, each figure corresponding to a specific characteristic of the setup:

the kind of machining, loading method, equipment used;

the cutting tool selected for machining the type item;

the constraints on setting the cutting tool with respect to the zero point of the machine tool.

The code looks:

where all digits of three representation for a new setup card indicate zero items of the loading setup chart. It is given the conventional index number 1111.

Corresponding to each loading setup card is a controlling program that is a copy of the controlling program for the operation on the item. This program contains technological information: numbers of machines and tools, cutting conditions, technological comments. Information on the specific dimensions of the cutting tool during machining of the given item are not reflected in the loading program. This information is necessary when developing a new controlling program.

Classification of operations on items, the use of the principle of standardization in developing setup charts and controlling programs for tape-controlled machine tools reduces program development time by a factor of 3-4, enables grouping of dissimilar items according to the same types of operations, which makes machining by batches greater in scope under short-series production conditions, extends the applicability of quickly readjustable group fixtures and tool setups on tape-controlled machine tools, increases the degree of equipment for operations while simultaneously reducing expenditures for equipment, and ensures development of setting conditions on a single loader operation that are then extended to all operations on the item in the group.

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CSU 184

METALWORKING EQUIPMENT

WASTE, INEFFICIENCY CONTINUE TO PLAGUE MACHINE TOOL INDUSTRY

Press Problems, Progress Reported

Moscow SOVETSKAYA ROSSIYA in Russian 1 Apr 80 p 2

[Part 1 of article by special correspondent A. Pyatunin, Voronezh - Moscow]

[Text] The working career of lathe and boring machine operator Vasily Mikhailovich Kolesov spans forty years. During all this time he has not changed his profession a single time.

This experienced veteran of the Voronezhskiy Mashinostroyeniye Association, bearer of the Order of Lenin and two combat orders, respects and values his work. He is therefore worried about the problems addressed by the recent conference of workers of the machine tool industry in the Central Committee of the CPSU relative to the resolution "On Significantly Improving the Technical Level and Competitiveness of Metalworking, Foundry and Woodworking Equipment and Instruments," adopted by the CPSU Central Committee and the USSR Council of Ministers. Really, what machine tool builder would not be hurt by the criticism voiced at the conference that the structure and quality of metalworking equipment falls far short of meeting the challenge of introducing those advanced technological processes in machine building that will ensure maximum growth in labor productivity, improve quality of products and improve the use coefficient of metal.

"We have many general-purpose lathes, drill presses, milling and planing machines in our shops," Vasily Mikhailovich notes. "Toward the end of a shift a pile of metal chips and shavings forms by each of them. And this is not surprising. Often the weight of the waste being machined exceeds the weight required for the finished part by a factor of 1.5-2. It leaves a bitter taste in one's mouth to see more than 50 tons of metal waste hauled out through the plant's gates every day. And over a period of a month the shavings will amount to 1,500 tons! And this is in the leading plant in this sector of industry."

Vasily Mikhaylovich is also concerned about another problem. Because of a shortage of machinists, far from all the metalworking equipment is in operation for three, or even two shifts. And at night activity in the shops dies out altogether. Although hundreds of workers have taken the example of outstanding shops and now operate multiple machines, although they are working by the brigade method, output is still low. And Vasily Mikhaylovich is offended all the more since his plant produces forging and pressing equipment that works metal by the most economic method -- pressure.

"It is right that the question should be raised of sharply improving the technical level and expanding production of progressive equipment for machine building," Kolesov says. "The task now before machine tool workers is not only to fulfill, but to surpass the program established for the 11th Five-Year Plan. And many problems, I know, will have to be solved in order for us to accomplish this goal."

I was to hear the same opinion from many enterprise laborers, managers and specialists, as well as scientists and designers -- the creators of new technology. The general director of the Voronezh Mashinostroyeniye Production Association, V. Golovin, speaking of the tasks that face his collective, explained that the association is now manufacturing a wide range of high-efficiency crank-drive and drop-forge presses. This association has in recent times developed and begun production of 26 types of automated and mechanized complexes and lines. But, unfortunately, they are unable to fill even one-third of customer orders for this modern equipment. In 1977 its plant produced the first lot of heavy, double-action drop-forge presses -- three units. In each of the last two years the association was able to turn out five such machines. And orders have come in from various ministries for more than 70 of these presses just for 1980! In addition, a number of foreign firms are asking to sell the new press. However, the association cannot increase production of these remarkable machines: they do not have the capacity.

It is for the same reason that other enterprises of the country are also producing forging and pressing equipment in meager numbers. Visiting the test plant of the Experimental Scientific Research Institute of Pressing and Forging Machine Building (IbMKnash) in Voronezh, one sees that even today they already have and are putting the finishing touches on many efficient machines and entire lines equipped with digitally programmed control, means of automation and mechanization that can transform a steel bar, for example, into totally finished articles without a single gram of waste!

"Scientists and designers of our institute and others in the industry, plants and specialized design bureaus have already developed a large complement of modern forging and pressing machines and automatic systems," says IbMKnash director V. Novikov. "This makes it possible to fundamentally change existing metalworking technology. The matter now rests with production of the new machines."

Ministry of Machine Tool and Tool Building Industry) continues year after year to increase production of general-purpose manually controlled metal-cutting machines. From 186 units in the last year of the 8th Five-Year Plan production of these machines grew to 237,000 units in 1978! The relative proportion of forging and pressing machines changed very slowly during this time and even now they account for less than one-fifth of total production of metalworking equipment.

Ministry leaders explain this situation by miscalculations in planning. In one of his articles published last year in the central press, the Minister of the Machine Tool and Tool Building Industry, A. Kostousov, lamented that the national economy now has 1.3 times as many lathes and 1.6 times as many boring machines as it has lathe and boring machine operators. In this article he reproached USSR Gosplan for "unit and tonnage planning," which does not help to improve the structure of the machine tool inventory, and for reducing capital investment in the industry below that provided for in the plan.

But then even those funds which the government allocated to machine tool building were used in far from the best way. In the 9th Five-Year Plan, for example, of total capital investment the share devoted to development of forging and pressing machine building was 13.5 percent, while the share devoted to metal-cutting machines was 46 percent. Little has changed in generation of capacities for production of forging and pressing equipment or in the structure of the machine tool inventory during four years of the current five-year plan. The plan called for reconstruction or expansion during this time of a number of existing plants for forging and pressing machine building. But, due to the fault of customers and contractors, the established goals were not met at many facilities. For example, Voronezhskiy Mashinostroyeniye was to put new capacities into operation this year for production of automatic lines and unique forging and pressing equipment intended for plants in the tractor and agricultural equipment industry. But, due to various problems in coordination, work on the main start-up facility was very late in starting and during the last three years the builders have not even completed the volume of work that they scheduled. Of 15 million rubles worth of work five million is still not done.

A particularly alarming situation has developed at the site the Sverdlovskiy plant for production of sheet-stamping automatic lines — the only one of its kind in this branch of industry. It is now being rebuilt and it was envisioned that the new plant would turn out its first products in 1979.

The plant is, figuratively speaking, still in diapers and many of its shops exist only on working drawings and drafts. The general contractor — USSR Ministry — year after year fails to meet not only the goals set by the five-year title list, but even its own "amended" plans.

It would seem, with such a situation as this in commissioning of new capacities, that most serious attention should be devoted to placing a full load on existing capacities. After all, the level of equipment use in many enterprises of the industry is very low. While the work shift coefficient exceeds 1.7 in Voronezhmashpress (which does not satisfy functionaries of the enterprises), it is slightly more than 1.3 in the Azov and Orenburg press building enterprises. And one additional tenth in this coefficient yields millions of rubles worth of additional production.

Both managerial and state watch should be kept on all pressing and forging equipment produced. This equipment is far from uniform in technical level and economic efficiency. And if one takes into account the fact that its accessory equipment is also meager, then the scope and complexity of the challenges facing organizers, designers and technologists of the industry become clear.

"We turn out bare-bones machine tools and presses...." This sentence can be heard often. The fact of the matter is that an absolute majority of forging and pressing machines are turned out without means of automation and mechanization and without the necessary assortment of stamping accessories. True, it should be said, a long-range program for mechanization and automation of all forging and stamping production has already been developed by specialists of Minstankprom and EnIKMash. The proportion of automated equipment is supposed to reach one half of yearly production in 1985.

The Gorkiy, Volga and Kam automotive plants and a few other industrial enterprises and associations in our country have their own large forging facilities. A new, exemplary forging and stamping facility is now being built by Moscow's AvtoZIL in Ryazan'. The Voronezhmashpress collective has set about outfitting this facility with modern equipment. These two very large production associations have concluded an agreement for creative collaboration. In the end, the Voronezh press builders will turn over to the automobile makers a ready-to-operate automated facility, outfitted with the latest word in equipment and brought up to its design capacity. One must assume that the valuable initiative of these two associations — Voronezhmashpress and ZIL — will be energetically supported by other suppliers and customers for forging and pressing equipment. Because it is not individual presses, even highly efficient presses, but automated lines and complexes, sectors and shops that will determine the future face of forging and pressing production in our country.

And this "face" is difficult to imagine without man's new and reliable helpers — industrial robots. This automatic manipulator is being changed more and more often from an object of fantasy into an entirely ordinary, and in a number of cases simply irreplaceable, working tool. This is why the current five-year plan already calls for expansion of the industrial robot family and organization of their serial production.

The first chief planning and design institute for forging and pressing robot building in the country -- "Kuzrobot" -- was created five years ago in Togliatti. However, this new forward-looking institute has evidently had bad luck.

"We have more than 700 people on our staff," says the institute's chief designer, A. Krivitskiy. "But up until the present they are still huddled in unsuitable facilities scattered all over the city. The institute has neither a planning base nor an experimental test base. And when these bases will be created is not known."

It is also to the great detriment of our country that problems far more simple than production of robots are not being solved in a timely, deliberate and business-like manner. What is the explanation, let us say, for the lag in stamping, which has become chronic over a period of several five-year plans? As one laborer aptly said: "After all, this is just the same as maintaining a cow, but not milking her for lack of a pail." An all-union industrial association has been created and is operating in the Minstankprom system. But it is doing a very poor job of coping with its tasks.

"We are providing only six percent of the stamping machines required by various branches of industry," says the chief of the association, V. D'yakov. "We cannot produce more; we do not have the capacities. Not a single plant has been built in our system in the last 12 years. We have brought these questions before USSR Gosplan several times and we have made specific recommendations, but they have not been accepted."

And there are other important questions, on resolution of which success of retooling forging and stamping production will largely depend. This has in mind improvement of planning and administration of this pivotal sector and the ability of managers at the upper and intermediate levels to recognize problems and solve them in a timely, comprehensive manner.

In Networks of Coordination

~~Source~~ SOVIETSKAYA RUSSIA in Russian 2 Apr 80 p 2

[Part II of article by special correspondent A. Pyatunin, Voronezh - ~~Source~~]

[Text] In the opinion of the chief of the Moyashkumash Industrial Association, A. Grishkov, one of the principal reasons for the obvious lag in forging and pressing equipment production is an imperfect system of planning for networking equipment in units.

"Until recently USSR Gosplan and Gosnab required Minstankoprom to produce more metal-cutting machines," says Comrade Grishkov. "For this reason due attention was not devoted to our subsector of the industry."

Unfortunately, even now, when the question of accelerating production of new types of forging and pressing machines with means of automation and mechanization would seem to clear to everyone, USSR Gosplan continues as before to center its efforts primarily on unit indicators and quotas. Here is a timely example. The Sal'sk plant for production of forging and pressing equipment has designed and built test models of several complements of modern means for automating and mechanizing presses produced by this enterprise. These make it possible to increase productivity of these machines by a factor of six to eight.

The Soyuzkumash VPO (all-union production association) proposes to reduce production of "bare-bones" presses already in 1980 and change over to output of automated lines and complexes, but, it goes without saying, in smaller numbers. And what is the response to this proposal? Gosplan and Gosnab categorically oppose the idea. The presses, they say, are already "allocated" and promised to customers.

"In the future we will continue to plan product output to enterprises and associations in units," B. Zakharov, a responsible official in the branch section of Gosplan, stressed in our conversation. "If we plan by cost, they will choose so many parts and assemblies for complements that the cost of the machines will be unjustifiable."

There is no argument but that such a risk exists. Forging and pressing equipment as delivered is far from uniform in efficiency, but then a price is at times set for it without concern for what benefit the customer will derive from it. This means, at least, that questions of setting prices must be resolved on a more valid basis. And in order to discipline manufacturers in this regard, it appears that is necessary, for the time being, to plan production and distribution, particularly of new automated forging and pressing machines and complexes, in both units (with specific nomenclature indicated) and total cost terms. This will, to a large degree, conform with the principles set forth in party and government resolutions on improving planning and the management mechanism.

Another point is worthy of attention and reevaluation: orientation toward customer orders alone, which officials of USSR Gosplan and Gosnab take as their basis and which often justify the output of obsolete equipment. Customer demand must also be carefully studied, analyzed, shaped and channeled in the proper direction. Then we would not have such a paradoxical situation as has arisen just now. For the last year of the upcoming five-year plan customers are requesting delivery of 20,000 hammers. But the new presses and automatic lines are in limited demand.

Why is such a distorted picture taking form? I think that it is not only because many enterprises -- the users of metal -- have primitive blacksmith shops, where the hammer is considered the most suitable general-purpose tool. Many plant engineers and technologists simply do not want to bother with new forging and stamping equipment, to be concerned with charging up the machines or acquiring the scarce stamping instruments. And there are those who actually do not know what kinds of modern machines are already being produced and will be produced by our industry in the near future.

It happens that a worthy item of new equipment is registered and advertised but, as it turns out, is not included in the order brochures that list equipment being offered to customers or in the established listing of forging and pressing machines. This rigid catalog is, for some reason, updated only once every five years. But life does not stand still; new machines are created and new technology developed every year.

V. Karshan, general director of the Voronezh Forge and Press Production Association Imeni Kalinin, tells this curious story. At the beginning of this five-year plan their designers created an automated equipment system which was more compact and twice as efficient as conventional general-purpose machines. However, this new complex has not been included in the active equipment listing and is up to the present still considered a "bastard child." At its own risk and on its own responsibility, the plant is turning out 20 of these complexes each year, while orders for more than 200 have been received.

V. Karshan, who worked for a long time as chief designer in the plant's design bureau, told us of many other artificial barriers which prevent creation of new machines from keeping pace with technical progress. In the existing system, for any new part which has not been provided for in the standard -- even if the part is twice as good as the old one -- a designer must seek more than 20 permits and visas! It is understood that the standard is low, but it is also obvious that each progressive innovation must be endowed with legal rights as quickly as possible. After all, years are often spent in this entanglement. Life urgently requires a reexamination of a number of standards documents which regulate the process of developing and producing new equipment.

We cannot but agree with criticism voiced by producers against such a generalized indicator, recommended by economists, as "the price of one ton of forging-pressing machines (KPM)", regardless of the complexity of manufacture of the equipment or its degree of automation. This is a source of constant disagreement and friction between suppliers and customers, particularly as it concerns production of means of automation and mechanization. Their physical weight is low compared to that of the basic equipment, but they are very labor intensive. The customer wants a press that is, at the same time, automated and inexpensive. But design and

manufacture of means of mechanization and automation are often far more complex than that of the press itself. Therefore, neither the customer nor the manufacturer is interested in their production. Only one solution can be seen: the responsible ministries must hasten to develop centralized production of means of automation and mechanization in specialized enterprises and shops, where experience shows that the job can be done at lower cost with higher product quality.

The 11th Five-Year Plan must be a five-year plan of fundamental technical reequipping of this branch of industry. We face the necessity of putting a number of new plants and shops into operation for production of forging and pressing equipment and means of automation and mechanization. Success of this undertaking will largely depend on planners and the quality of their work. How ready are they for the demands of life and for the new situation which has now developed in the industry?

Subordinate to Minstankoprom is the State Planning Technological Institute of Forging and Pressing Machines -- GPTIKuzmash -- in Voronezh. This institute has a large worker collective -- about 5,000 people. This composite organization is entrusted not only with developing plans for modern production, but also with implementing them.

Unfortunately, the institute is coping poorly with its assigned tasks. The practice of planning that has been established at the institute lags far behind the increased demands of scientific and technical progress. It does not fully ensure improvement in efficiency and quality of production. Institute workers do not make sufficient use of domestic and foreign experience and do not attach proper significance to scientific quest or formulation of new planning and technological decisions.

Such were conclusions drawn by the bureau of the Voronezh party obkom when it discussed the work of GPTIKuzmash last October. As a result of defective technical decisions and major errors in compilation of estimates during the last eight years, the planners were responsible for a rise in construction costs in six enterprises and organizations amounting to 640,000 rubles.

As regards introducing modern technological processes into production, institute workers simply do not get around to it. Nobody is seriously involved with this matter.

"After all, we only began to speak of automation and mechanization in forge and press production at the beginning of the current five-year plan. And they began to ask for economic calculations of the efficiency of the different technological processes only last year," V. Zolotov, director of the institute, justifying its evident lag behind the times. And, as if to confirm his words, he reports these sad facts: almost all the planning estimate documentation prepared by the institute in recent years is outdated and needs to be reaccomplished. And planning estimates

have not been done at all for a number of new plants which are to be built in the next five-year plan.

It is not by chance that the main demands for raising the technical level of forge and press production are directed to Minstankoprom. This ministry is, figuratively speaking, the chief technologist of machine building and metalworking. But it will be difficult for this technologist to cope with his assigned tasks unless there is a restructuring of the work of the related branches of industry -- suppliers of materials and equipment accessories and users of forging and pressing equipment.

First of all, this applies to the metallurgists. For example, an exceptionally large economic effect could be derived from rapid development of powder metallurgy, which opens a wide road for fundamentally new, waste-free production technology. Collectives of plants of Soyuzkuzmash and the special design bureau for forging and pressing machines and automatic lines have already created highly efficient equipment for pressing powders of ferrous and non-ferrous metals as well as hard alloys.

"We have a whole range of mechanical, hydraulic and gauging presses," says chief of the special design bureau, A. Krupenko. "But wide application of these presses is being held back because of low-volume production of metal powders."

The press builders are not satisfied with some important types of accessory complements being supplied to them by enterprises of the Ministry of the Electrical Equipment Industry, as well as the Soyuzgidravlika All-Union Industrial Association, which is under the authority of Minstankoprom itself. The articles in question are electrical equipment, digitally programmed control units and pneumatic equipment. In technical level and operational reliability they lag behind modern requirements and are inferior to the best foreign models.

As we can see, many urgent problems have built up. From among these we would like to point out one which will largely determine the success of fulfillment of tasks set forth by the party and the government: training and retraining of personnel for forging and stamping production. After all, you cannot put an ordinary blacksmith in control of a complex press or automatic line. Many old blacksmiths and machinists must be retrained and new qualified stampers, operators, programmers and maintenance personnel must be trained for the new equipment. Meanwhile masters in these professions are not being trained at all or are being trained in very small numbers. Even in Voronezh, where there is a whole "cluster" of major enterprises, planning and design institutes and bureaus for forge and press machine building, there is not a single professional-technical school or trade school training such personnel. The technical institutes of higher learning, which produce general engineers and technologists, devote very little time to study of new forging and pressing equipment and modern technological process for working metal under pressure.

It is, of course, no easy task to reequip forge and stamping production on a country-wide scale and to make it a leading and highly efficient business. This will certainly require large capital investment by the state and great intensity, energy, initiative and creativity from a whole army of workers -- from ministry and department leaders to rank-and-file laborers.

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